United States Environmental Protection Agency
Office of Water 4606
EPA 815-P-00-002 June 2001

Occurrence of Unregulated Contaminants in Public Water Systems-A National Summary

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ACRONYMS

Chemical Abstract Services (CAS)

Chemical Monitoring Reform (CMR)

Community Water System (CWS)

Dibromochloropropane (DBCP)

Environmental Protection Agency (EPA)

Ethylene Dibromide (EDB)

Ground Water (GW)

Ground Water - Purchased (GWP)

Ground Water Under Direct Influence (GUDI)

Ground Water Under Direct Influence - Purchased (GUP)

Health Advisory Level (HAL)

Health Reference Level (HRL)

Inorganic Chemical (IOC)

Maximum Contaminant Level (MCL)

Method Detection Limit (MDL)

micrograms per liter (Fg/L)

milligrams per liter (mg/L)

Minimum Reporting Level (or Limit, MRL)

National Contaminant Occurrence Database (NCOD)

National Primary Drinking Water Regulations (NPDWRs)

National Water Quality Assessment Program (NAWQA)

Non-Transient Non-Community Water System (NTNCWS)

Office of Ground Water and Drinking Water (OGWDW)

Percentage of Systems with Exceedances (>MCL/ >HRL/ >HAL)

Percentage of Systems with Detections (>MRL)

Public Water System (PWS)

ACRONYMS (continued)

Public Water System Identifier (PWSID)

Safe Drinking Water Act (SDWA)

Safe Drinking Water Information System (SDWIS)

Safe Drinking Water Information System/Federal Version (SDWIS/FED)

Surface Water (SW)

Surface Water - Purchased (SWP)

Synthetic Organic Chemical (SOC)

Tetrachloroethylene (PCE)

Toxic Release Inventory (TRI)

Transient Non-Community Water System (TNCWS)

Trichloroethylene (TCE)

Trihalomethane (THM)

United States Geological Survey (USGS)

Unregulated Contaminant Monitoring Information System (URCIS)

Unregulated Contaminant Monitoring (UCM)

Unregulated Contaminant Monitoring Regulation (UCMR)

Volatile Organic Chemical (VOC)

EXECUTIVE SUMMARY

This summary provides a condensed overview of the national occurrence report entitled *Occurrence of Unregulated Contaminants in Public Water Systems: An Initial Assessment* (EPA 815-P-00-001). The complete, original report, referred to as the "complete National Occurrence report," includes a comprehensive overview of the management and initial assessment of the unregulated contaminant occurrence data currently available to EPA. The data are from the required monitoring of unregulated contaminants conducted by public drinking water systems prior to 1998. Specifically, the assessments summarized here (and described in detail in the complete National Occurrence report referenced above) are based on the occurrence data from the Unregulated Contaminant Information System (URCIS) database and the Safe Drinking Water Information System/Federal Version (SDWIS/FED) database. The objective of the occurrence assessment is to enhance the scientific understanding of the occurrence of unregulated contaminants in public drinking water systems, and to refine the approach of management and analysis of contaminant occurrence data.

The contaminant occurrence analyses and findings presented in this report are based on national cross-sections of state data (i.e., a subset of representative state data) derived from the URCIS (Round 1) and SDWIS/FED (Round 2) databases. The occurrence findings presented here are not based on the entire collection of state compliance monitoring data contained in the URCIS (Round 1) and SDWIS/FED (Round 2) databases. The data that were used as the basis for the analyses in this report are available upon request from EPA Office of Ground Water and Drinking Water. Requests for this data should be sent to ucmr.report@epa.gov.

This summary report includes descriptions of Round 1 and Round 2 unregulated contaminant monitoring data, reviews the extensive data quality management necessary to conduct occurrence analyses, outlines the construction of a national cross-section of states from each of the two databases, and summarizes the occurrence analyses (based on the cross-sections) of the 62 unregulated contaminants in the Round 1 data set and the 48 unregulated contaminants in the Round 2 data set. The Round 1 data are contained in the URCIS database, and the Round 2 data are contained in the SDWIS/FED database.

The URCIS database (Round 1 data) contains public water system monitoring results, generally from 1988 to 1992, for unregulated contaminants collected under the authority of the Safe Drinking Water Act (SDWA). Forty states/primacy entities have submitted PWS monitoring data to URCIS. Round 2 monitoring data, generally collected from 1993 to 1997, were reported directly to the SDWIS/FED database. Thirty-five states/primacy entities have submitted Round 2 PWS monitoring data to SDWIS/FED. The raw data from these two databases were reviewed extensively and edited for data quality considerations to ensure consistency and repeatability in the analyses.

A data management approach was used in this study to develop a national cross-section of states that enables occurrence analyses that are indicative of national occurrence. All states with monitoring data were evaluated according to their distribution across a range of pollution potential indicators and spatial/hydrogeologic diversity. A select group of states, representing a balanced distribution across these pollution-potential measures and across the nation geographically, were then used to construct national cross-sections (one cross-section from Round 1 data, and another from Round 2 data) that would provide reasonable representation of national occurrence. While the national cross-sections cannot be considered "statistically representative," the constructed cross-sections are very large samples (24 and 20 states, respectively), providing analytical occurrence results that are clear indications of central tendency of the occurrence data, and are generally indicative of national contaminant occurrence.

The cross-sections have been constructed with a large number of occurrence data to broadly reflect national coverage. The 24 cross-section states of URCIS (Round 1) data represent approximately 44% of public water systems nationally and 51% of the population served by public water systems. The 20 cross-section states of SDWIS/FED (Round 2) data represent approximately 41% of public water systems nationally and 34% of the population served by public water systems. The data from these two separate cross-sections are used to compute contaminant occurrence measures as an approximation of national occurrence.

Summary assessments of data coverage and analyses of unregulated contaminant occurrence are then presented. Comparisons of Round 1 and Round 2 data coverage were made to evaluate if comparable states, public water systems, and contaminants are contained in both databases. Analytical summaries of occurrence of all contaminants for the Round 1 and Round 2 cross-section states are included. These occurrence assessments are based on measures such as the percent of public water systems with at least one analytical result greater than the minimum reporting level, and the percent of public water systems with at least one analytical result greater than the maximum contaminant limit (or heath reference level).

This national summary concludes with a brief description of the more detailed spatial and graphical assessments of select high occurrence contaminants.

The reader is referred to the complete National Occurrence report for full descriptions and more details of the data quality assessments, cross-section development, and contaminant occurrence analyses presented in this national summary.

ACKNOWLEDGMENTS

The compilation and analysis of the data summarized in this report were undertaken by EPA's Office of Ground Water and Drinking Water (OGWDW) to enhance the scientific understanding of the occurrence of unregulated chemical contaminants in public drinking water systems, and to refine the approach of management and analysis of contaminant occurrence data. This effort was directed by Mr. Guy Caruthers of OGWDW. This project began under the direction of Mr. Charles Job.

We would like to thank the many States, as well as the American Water Works Service Company, that contributed data sets and valuable advice. Thanks also to the many public water systems that conducted the monitoring that provided the contaminant occurrence data used in this report. Mr. Lewis Summers and Mr. Guy Caruthers of OGWDW managed the access to EPA's URCIS and SDWIS/FED databases, the repositories of data used in this project.

The Cadmus Group, Inc. served as the prime contractor for this project, supporting the data management, analysis, and report development. Dr. George Hallberg and Dr. Jonathan Koplos served as Cadmus Project Managers.

DISCLAIMER

This report does not constitute U.S. Environmental Protection Agency Policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

This document is designed to provide technical background for the Office of Ground Water and Drinking Water's program. The document does not, however, substitute for the Safe Drinking Water Act or EPA's regulations nor is this document a regulation itself. Thus, it cannot impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based on the circumstances.

I. INTRODUCTION

This report provides a summary overview of the management and initial assessment of unregulated contaminant occurrence data currently available to EPA. The data are from the required compliance monitoring of unregulated contaminants conducted by public drinking water systems prior to 1998. Specifically, this report summarizes assessments based on occurrence data from the Unregulated Contaminant Information System (URCIS) database (Round 1 monitoring data) and the Safe Drinking Water Information System/Federal Version (SDWIS/FED) database (Round 2 monitoring data) that were comprehensively presented and described in the report entitled *Occurrence of Unregulated Contaminants in Public Water Systems: An Initial Assessment* (EPA 815-P-00-001; referred to as the "complete National Occurrence report"). The "complete National Occurrence report" includes a comprehensive overview of the assessment and initial analysis of the unregulated contaminant occurrence data currently available to EPA.

This national summary, a condensed version of the complete National Occurrence report, presents a description of URCIS (Round 1) and SDWIS/FED (Round 2) data, reviews the extensive data quality management necessary to conduct occurrence analyses, outlines the construction of a national cross-section of states from each of the two databases, and summarizes the occurrence analytical findings for the 62 unregulated contaminants in the Round 1 data set and the 48 unregulated contaminants in the Round 2 data set. For complete, detailed evaluations and extensive tabulations of all contaminant occurrence findings for both Round 1 and Round 2 data, as well as spatial and graphical occurrence assessments of select high-occurrence contaminants, the reader is directed to the complete National Occurrence report referenced above (with the chapters in this national summary corresponding to the same in the complete National Occurrence report).

I.A. Background

The Safe Drinking Water Act (SDWA), as amended in 1986, required Public Water Systems (PWSs) to monitor for specified "unregulated" contaminants, on a five year cycle, and to report the monitoring results to the states. Unregulated contaminants do not have an established or proposed National Primary Drinking Water Regulation (NPDWR), but are formally listed and require monitoring under federal regulations. The intent is to gather scientific information on the occurrence of these contaminants to enable a decision regarding whether regulations were needed. All non-purchased community water systems (CWSs), and non-purchased non-transient non-community water systems (NTNCWSs), with greater than 150 service connections were required to conduct this unregulated contaminant monitoring.

The 1993 amendments to SDWA added other contaminants to the unregulated contaminant list for required monitoring, and the 1996 SDWA amendments directed EPA to develop a revised program for such monitoring. This new program was formally published in the Federal Register on September 17, 1999 (64 FR 50556) as the Unregulated Contaminant Monitoring Regulation, now referred to as the UCMR (1999). This new UCMR monitoring will begin in 2001, and must produce a new list of unregulated contaminants for monitoring every 5-years.

To clarify the history of unregulated contaminant monitoring, a naming system is introduced to distinguish between the different monitoring periods and the contaminant lists included in a specific monitoring period. The first unregulated contaminant monitoring list was published in 1987 and will be referred to as the UCM (1987) list. The UCM (1987) list was followed by the UCM (1993) list (generated through the 1993 SDWA Amendments) and the recent UCMR (1999) list (generated through the 1999 development of the Unregulated Contaminant Monitoring Regulation-UCMR-list of contaminants. The occurrence analyses in this report are based on the historic data from the UCM (1987) and UCM (1993) lists. Occurrence data for the UCM (1987) and UCM (1993) contaminants, as well as for other contaminants listed in the following section, are contained in two databases. (To date,

there are no data yet available from the UCMR monitoring, which was initiated in January, 2001.) These databases are briefly summarized in the following sections.

I.B. Unregulated and Regulated Contaminants, Databases, and Monitoring Timeframe

Figure I.B.1 diagrams the inter-relationship of the various databases, monitoring rounds and contaminant lists discussed in this report. Tables I.B.1 and I.B.2 describe in more detail the specific contaminants included in each database.

Figure I.B.1. Diagram of the Inter-Relationship of Various Databases, Monitoring Rounds and Contaminant Lists Discussed in the Report

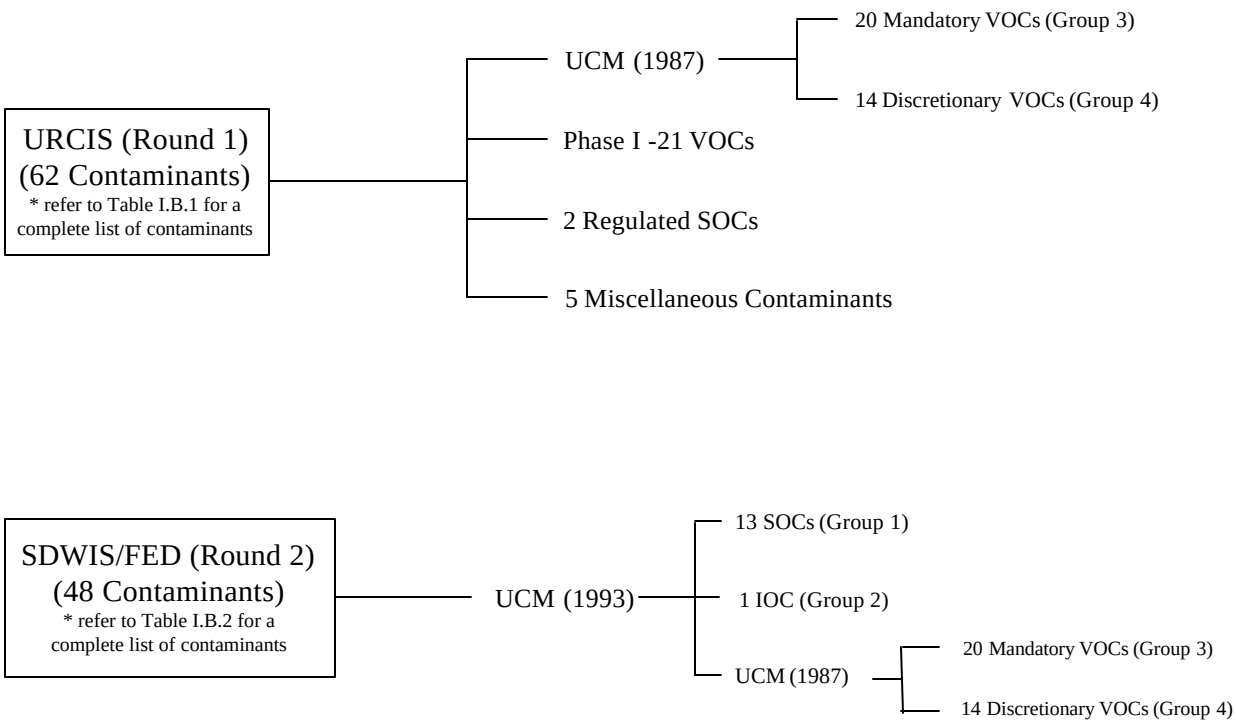


Table I.B.1. List and Description of Contaminants with Data in URCIS (Round 1) (approximately 1987-1992)

Contaminant	CAS Number	SDWIS ID	MCL HAL *, or HRL**	UC Round		UC Group	Common Sources of Contaminant
Inorganic Chemicals							
No Inorganic Chemicals in UCM (1987) data							
Synthetic Organic Chemicals - Regulated							
Dibromochloropropane (1,2-Dibromo-3-chloropropane; or DBCP)	96-12-8	2931	0.2	1		R	Soil fumigant on soybeans, cotton, pineapple, orchards
Ethylene Dibromide (1,2-Dibromoethane; or EDB)	106-93-4	2946	0.05	1		R	Leaded gas additives; leaching of soil fumigant
Volatile Organic Chemicals - Group 3							
Bromobenzene	108-86-1	2993	--	1	2	3	Solvent, organic synthesis
Bromodichloromethane	75-27-4	2943	60**	1	2	3	Disinfection-by-product, marine microalgae
Bromoform	75-25-2	2942	400**	1	2	3	Disinfection-by-product, solvent for waxes, greases, oils
Bromomethane (Methyl Bromide)	74-83-9	2214	10	1	2	3	Soil and space fumigant, extraction solvent, oceans
Chloroform	67-66-3	2941	600**	1	2	3	Solvent, DBP, auto exhaust, chemical intermediate
Chloroethane	70-00-3	2216	--	1	2	3	Chemical intermediate, solvent, aerosol, solvent metabolite
Chloromethane (Methyl Chloride)	74-87-3	2210	3	1	2	3	Oceans, volcanoes, fires, smoke exhaust, solvent, DBP
Dibromochloromethane	124-48-1	2944	60**	1	2	3	Organic synthesis, manufacture of fire extinguishing agents, refrigerants, aerosol propellants and pesticides.
Dibromomethane	74-95-3	2408	--	1	2	3	Solvent, gage fluid, use in chemical synthesis, marine algae
1,1-Dichloroethane	75-34-3	2978	5	1	2	3	Leaded gasoline; fumigants, paints
1,3-Dichloropropane	142-28-9	2412	--	1	2	3	Chemical intermediate for cyclopropane
2,2-Dichloropropane	594-20-7	2416	--	1	2	3	Solvent
1,1-Dichloropropene	563-58-6	2410	--	1	2	3	Solvent
1,3-Dichloropropene	542-75-6	2413	40**	1	2	3	Solvent, used in fungicide
m-Dichlorobenzene	541-73-1	2967	600*	1	2	3	Dump leachate, fumigant, solvent, chemical intermediate
o-Chlorotoluene	95-49-8	2965	100	1	2	3	Drain pipe solvent
p-Chlorotoluene	106-43-4	2966	100	1	2	3	Solvent, chemical intermediate for dyes, organic chemicals
1,1,1,2-Tetrachloroethane	630-20-6	2986	70*	1	2	3	Product of manufacture of other chloroethanes
1,1,2,2-Tetrachloroethane	79-34-5	2988	2*	1	2	3	Used in paint manufacturing; cement; paint removers; moth-proofing
1,2,3-Trichloropropane	96-18-4	2414	40	1	2	3	Paint/varnish remover, solvent, degreasing agent
Volatile Organic Chemicals - Group 4							
Bromochloromethane	74-97-5	2430	10	1	2	4	Organic synthesis and fire extinguishers
Dichlorodifluoromethane	75-71-8	2212	1,000	1	2	4	Refrigerant, aerosol propellant, rocket propellant, foaming agent, plastics
Hexachlorobutadiene	87-68-3	2246	0.9**	1	2	4	Solvent, synthetic rubber, pesticide, insecticide, herbi- cide, chemical intermediate

Contaminant	CAS Number	SDWIS ID	MCL HAL *, or HRL**	UC Round		UC Group	Common Sources of Contaminant
Isopropylbenzene	98-82-8	2994	--	1	2	4	Production of petroleum refining; evaporation and combustion of petroleum
n-Butylbenzene	104-51-8	2422	--	1	2	4	
n-Propylbenzene	103-65-1	2998	--	1	2	4	Solvent, used in textile dyeing and printing
Naphthalene	91-20-3	2248	140**	1	2	4	Fungicide, moth repellant
p-Isopropyltoluene	99-87-6	2030	--	1	2	4	
sec-Butylbenzene	135-98-8	2428	--	1	2	4	
tert-Butylbenzene	98-06-6	2426	--	1	2	4	
1,2,3-Trichlorobenzene	87-61-6	2420	--	1	2	4	Termite control; chemical intermediate
Trichlorofluoromethane	75-69-4	2218	175*	1	2	4	Solvent, chemical intermediate, halocarbon aerosol propellant and refrigerant
1,2,4-Trimethylbenzene	95-63-6	2418	--	1	2	4	Chemical intermediate, solvent, gasoline, coal tar, and petroleum products
1,3,5-Trimethylbenzene	108-67-8	2424	--	1	2	4	
Volatile Organic Chemicals - Regulated							
Benzene	71-43-2	2990	5	1		R	Some foods; gas, drugs, pesticide, paint, plastic industries
Carbon tetrachloride	56-23-5	2982	5	1		R	Solvents and their degradation products
Chlorobenzene	108-90-7	2989	100	1		R	Waste solvent from metal degreasing processes, discharge from chemical and agricultural chemical factories
cis-1,2-Dichloroethylene	156-59-2	2380	70	1		R	Waste industrial extraction solvents
1,2-Dichloroethane	107-06-2	2980	5	1		R	Leaded gas, fumigants, paints
Dichloroethene	75-35-4	2977	7	1		R	Plastics; dyes; perfumes; paints
Dichloromethane (Methylene chloride)	75-09-2	2964	5	1		R	Paint stripper, metal degreaser, propellant, extraction
1,2-Dichloropropane	78-87-5	2983	5	1		R	Soil fumigant; waste industrial solvents
Ethyl benzene	100-41-4	2992	700	1		R	Gasoline; insecticides; chemical manufacturing wastes
o-Dichlorobenzene	95-50-1	2968	600	1		R	Paints, engine cleaning compounds, dyes, chemical wastes
p-Dichlorobenzene	106-46-7	2969	75	1		R	Room and water deodorants, and "mothballs"
Styrene	100-42-5	2996	100	1		R	Plastics, rubber, resin, drug industries; leachate from city landfills
Tetrachloroethylene	127-18-4	2987	5	1		R	Improper disposal of dry cleaning and other solvents
Toluene	108-88-3	2991	1,000	1		R	Gasoline additive; manufacturing and solvent operations
trans-1,2-Dichloroethylene	156-60-5	2979	100	1		R	Waste industrial extraction solvents
1,2,4-Trichlorobenzene	120-82-1	2378	70	1		R	Herbicide production; dye carrier
1,1,1-Trichloroethane	71-55-6	2981	200	1		R	Adhesives, aerosols, textiles, paints, inks, metal degreasers
1,1,2-Trichloroethane	79-00-5	2985	5	1		R	Solvent in rubber, other organic products; chemical production wastes
Trichloroethene (Trichloroethylene)	79-01-6	2984	5	1		R	Textiles, adhesives and metal degreasers
Vinyl chloride	75-01-4	2976	2	1		R	May leach from PVC pipe; formed by solvent breakdown

Contaminant	CAS Number	SDWIS ID	MCL HAL *, or HRL**	UC Round		UC Group	Common Sources of Contaminant
Xylenes (Total)	1330-20-7	2955	10,000	1		R	By-product of gasoline refining; paints, inks, detergents
m-Xylene	108-38-3	2995	--	1			Xylene Isomers
o-Xylene	95-47-6	2997	--	1			
p-Xylene	106-42-3	2962	--	1	2		
Volatile Organic Chemicals - Other							
cis-1,3-Dichloropropylene	10061-01-5	2228	--	1			Used in organic synthesis and soil fumigants; used as a nematocide
trans-1,3-Dichloropropylene	10061-02-6	2224	--	1			Used in organic synthesis and soil fumigants for control of nematodes

Includes some regulated SOCs and VOCs, and the unregulated contaminants from UCM (1987) List. UC Round = data included in Round 1 and/or 2 monitoring and database; UC Group = contaminant group as specified in UCM (1993) Listing.

MCL=Maximum Contaminant Level
HAL=Health Advisory Level (as of December 2000)
HRL=Health Reference Level (concentration values used only as reference levels for analyses in this report)

The MCL, HAL, and HRL values are used in this report only as reference levels to facilitate occurrence assessments.

Table I.B.2. List and Description of Contaminants with Data in SDWIS/FED (Round 2) (approximately 1993-1997)

Contaminant	CAS Number	SDWIS ID	MCL HAL *, or HRL** (µg/L)		UC Round	UC Group	Common Sources of Contaminant
Synthetic Organic Chemicals - Group 1							
Aldicarb	116-06-3	2047	7**		2	1	Pesticide used with cotton, potatoes, others (widely restricted)
Aldicarb Sulfone	1646-88-4	2044	7**		2	1	Biodegradation of aldicarb
Aldicarb Sulfoxide	1646-87-3	2043	7**		2	1	Biodegradation of aldicarb
Aldrin	309-00-2	2356	0.002**		2	1	Soil insecticide
Butachlor	23184-66-9	2076	--		2	1	Herbicide for rice, used on annual grasses
Carbaryl	63-25-2	2021	700		2	1	Broad range pesticide (citrus, vegetables, lawns, nuts)
Dicamba	1918-00-9	2440	200		2	1	Herbicide for agriculture, rangeland, pasture, industry
Dieldrin	60-57-1	2070	0.002**		2	1	Insecticide
3-Hydroxycarbofuran	16655-82-6	2066	--		2	1	Metabolite of carbofuran
Methomyl	16752-77-5	2022	200		2	1	Insecticide for soybeans, cotton, other field and fruit crops
Metolachlor	51218-45-2	2045	70**		2	1	Herbicide for corn, soybeans, peanuts, cotton, pod crops
Metribuzin	21087-64-9	2595	91**		2	1	Herbicide used on grass and broadleaf weeds
Propachlor	1918-16-7	2077	90		2	1	Herbicide for corn and sorghum
Inorganic Chemicals - Group 2							
Sulfate	14808-79-8	1055	500,000**		2	2	Fertilizer, natural occurrence, some industrial uses

Contaminant	CAS Number	SDWIS ID	MCL HAL *, or HRL** (µg/L)	UC Round		UC Group	Common Sources of Contaminant
Volatile Organic Chemicals - Group 3							
Bromobenzene	108-86-1	2993	--	1	2	3	Solvent, organic synthesis
Bromodichloromethane	75-27-4	2943	60**	1	2	3	Disinfection-by-product, marine microalgae
Bromoform	75-25-2	2942	400**	1	2	3	Disinfection-by-product, solvent for waxes, greases, oils
Bromomethane (Methyl Bromide)	74-83-9	2214	10	1	2	3	Soil and space fumigant, extraction solvent, oceans
Chloroethane	70-00-3	2216	--	1	2	3	Chemical intermediate, solvent, aerosol, solvent metabolite
Chloroform	67-66-3	2941	600**	1	2	3	Solvent, DBP, auto exhaust, chemical intermediate
Chloromethane (Methyl Chloride)	74-87-3	2210	3	1	2	3	Oceans, volcanoes, fires, smoke exhaust, solvent, DBP
Dibromochloromethane	124-48-1	2944	60**	1	2	3	
Dibromomethane	74-95-3	2408	--	1	2	3	Solvent, gage fluid, use in chemical synthesis, marine algae
1,1-Dichloroethane	75-34-3	2978	5	1	2	3	Leaded gasoline; fumigants, paints
1,3-Dichloropropane	142-28-9	2412	--	1	2	3	Chemical intermediate for cyclopropane
2,2-Dichloropropane	594-20-7	2416	--	1	2	3	Solvent
1,1-Dichloropropene	563-58-6	2410	--	1	2	3	Solvent
1,3-Dichloropropene	542-75-6	2413	40**	1	2	3	Solvent, used in fungicide
m-Dichlorobenzene	541-73-1	2967	600*	1	2	3	Dump leachate, fumigant, solvent, chemical intermediate
o-Chlorotoluene	95-49-8	2965	100	1	2	3	Drain pipe solvent
p-Chlorotoluene	106-43-4	2966	100	1	2	3	Solvent, chemical intermediate for dyes, organic chemicals
1,1,1,2-Tetrachloroethane	630-20-6	2986	70*	1	2	3	Product of manufacture of other chloroethanes
1,1,2,2-Tetrachloroethane	79-34-5	2988	2*	1	2	3	Used in paint manufacturing; cement; paint removers; moth-proofing
1,2,3-Trichloropropane	96-18-4	2414	40	1	2	3	Paint/varnish remover, solvent, degreasing agent
Volatile Organic Chemicals - Group 4							
Bromochloromethane	74-97-5	2430	10	1	2	4	Organic synthesis and fire extinguishers
Dichlorodifluoromethane	75-71-8	2212	1,000	1	2	4	Refrigerant, aerosol propellant, rocket propellant, foaming agent, plastics
Hexachlorobutadiene	87-68-3	2246	0.9**	1	2	4	Solvent, synthetic rubber, pesticide, insecticide, herbi- cide, chemical intermediate
Isopropylbenzene	98-82-8	2994	--	1	2	4	Production of petroleum refining; evaporation and combustion of petroleum
n-Butylbenzene	104-51-8	2422	--	1	2	4	
n-Propylbenzene	104-51-8	2998	--	1	2	4	Solvent, used in textile dyeing and printing
Naphthalene	91-20-3	2248	140**	1	2	4	Fungicide, moth repellant
p-Isopropyltoluene	99-87-6	2030	--	1	2	4	
sec-Butylbenzene	135-98-8	2428	--	1	2	4	
tert-Butylbenzene	98-06-6	2426	--	1	2	4	
1,2,3-Trichlorobenzene	87-61-6	2420	--	1	2	4	Termite control; chemical intermediate

Contaminant	CAS Number	SDWIS ID	MCL HAL *, or HRL** (µg/L)	UC Round		UC Group	Common Sources of Contaminant
Trichlorofluoromethane	75-69-4	2218	175*	1	2	4	Solvent, chemical intermediate, halocarbon aerosol propellant and refrigerant
1,2,4-Trimethylbenzene	95-63-6	2418	--	1	2	4	Chemical intermediate, solvent, gasoline, coal tar, and petroleum products
1,3,5-Trimethylbenzene	108-67-8	2424	–	1	2	4	

Includes the unregulated contaminants from UCM (1993) List. UC Round = data included in Round 1 and/or 2 monitoring and database; UC Group = contaminant group as specified in UCM (1993) Listing.

MCL=Maximum Contaminant Level
HAL=Health Advisory Level (as of December 2000)
HRL=Health Reference Level (concentration values used only as reference levels for analyses in this report)

The MCL, HAL, and HRL values are used in this report only as reference levels to facilitate occurrence assessments.

I.C. Data Analysis

The contaminant occurrence analyses and findings presented in this report are based on national cross-sections of state data (i.e., subsets of representative state data) derived from the URCIS (Round 1) and SDWIS/FED (Round 2) databases. The occurrence findings presented here are not based on the entire collection of state compliance monitoring data contained in the URCIS (Round 1) and SDWIS/FED (Round 2) databases.

During initial URCIS and SDWIS/FED data quality assessments, significant data quality problems were identified. The data sources, data quality reviews, and the necessary data editing are described in detail in Section II of this report. Due to the data completeness and quality problems inherent in the raw URCIS and SDWIS/FED data, cross-sections of state data (one using URCIS data, and a second cross-section using SDWIS/FED data) were constructed to develop a nationally representative perspective for contaminant occurrence assessments. The detailed efforts to develop the nationally representative state cross-sections are described in Section III of this report.

An overview of data coverage (distribution of system types, months, years, etc. of the occurrence data) of the two entire databases (and of the two cross-sections) is presented in Section IV. In Section V, the contaminant occurrence analytical findings are presented. Note that the findings are based on the constructed state cross-sections (not the entire URCIS and SDWIS/FED databases). The key summary findings are presented in Table V.A.1 (for the URCIS 24-state representative cross-section; see Appendix A for full detailed findings) and Table V.B.1 (for the SDWIS/FED 20-state representative cross-section; see Appendix B for full detailed findings). Finally, Section VI presents additional occurrence assessments conducted for select high occurrence contaminants. The URCIS (Round 1) and SDWIS/FED (Round 2) data that were used as the basis for the analyses in this report are available upon request from EPA Office of Ground Water and Drinking Water. Requests for this data should be sent to ucmr.report@epa.gov.

All statistical analyses, and most database manipulations were conducted with SAS® statistical software. Some data formatting problems were corrected in Microsoft® Excel with the aid of specialized programs written in Visual Basic® or were corrected directly in SAS before the analysis began. After

analysis, results were typically downloaded into Excel for secondary analysis, or sorting, or the development of report tables.

II. DATA SOURCES AND DATA QUALITY REVIEW

II.A. URCIS (Round 1) Data

In this section of the summary, the unregulated contaminant monitoring data (from approximately 1988-1992) are reviewed for quantity, quality, and completeness. These Round 1 data were derived from the Unregulated Contaminant Information System (URCIS). Significant data review, formatting, and data quality checking and editing were required of this Round 1 data to enable the evaluations and analyses conducted for this initial contaminant occurrence assessment.

II.A.1. Description of Data

URCIS is a compilation of public water system monitoring results for unregulated contaminants, collected under the authority of SDWA, and reported to the states (as the primacy agents for SDWA). EPA requested that the states submit these data to EPA in the early 1990s, but no formal protocol or format had been established for reporting. Given the evolving nature of data management during this era, various data problems were encountered. EPA has been working on quality assurance and analysis of these data since 1992. Further data quality assessments and some preliminary analyses of the URCIS data were conducted and presented in the occurrence and data report prepared for EPA-OGWDW's Chemical Monitoring Revisions (CMR) project. This report, *A Review of Contaminant Occurrence in Public Water Systems* (EPA 816-R-99-006, 1999, USEPA, Office of Water), is referred to as the "CMR Report".

In 1999, EPA also transferred the URCIS data into SDWIS/FED, to join these URCIS Round 1 data with Round 2 data being submitted by the states into SDWIS/FED. (SDWIS/FED is the official database repository of data provided by public drinking water systems, and now includes data from an earlier EPA public water system URCIS database.)

For the analyses described in this summary, the data from the original URCIS database was used. URCIS contained data from only 40 states/primacy entities. The URCIS database includes data on 62 Round 1 contaminants: the 34 UCM (1987) VOCs; the 21 regulated Phase 1 VOCs; 2 regulated synthetic organic contaminants (SOCs); and 5 miscellaneous contaminants.

II.A.2. Data Management and Data Quality

During the analytical work conducted for the CMR report in 1997-1998, the URCIS database was reviewed for various data quality problems and subsequently edited to remove readily apparent problematic data to ensure the quality of the data used in the analysis. Due to a variety of data quality problems, including incorrect or incomplete data codes for source water type, system type, system size (population-served), contaminant type, sample date, system identification, etc., some data records were excluded from the analyses to maintain defensible data quality.

For some records, the data were of acceptable quality, but some system inventory information was missing. To enable use of these URCIS data records, the URCIS data were merged by public water system identification number (PWSID) with current SDWIS-Needs Survey PWS Inventory data to obtain missing system inventory information data on the source water, system type and population served for the

PWSs. After these data management and editing efforts, there are 3,452,530 analytical records for the 62 contaminants for analysis of the Round 1 data. Even with this extensive data management effort, there may still be data quality problems given the diverse sources of these data and the sheer size of the database. Recent reviews of the original database indicate that this does not appear to affect many data.

II.A.3. Further Data Review and Editing

Subsequent to the major editing efforts on this database, a secondary review of the 3.5 million records was undertaken. To begin, various descriptive statistics were compiled (state by state) to enable a more detailed review for data bias and representativeness. Some state data, as will be described, are so incomplete that their use would introduce bias into the analyses. These data are used in certain parts of this report to provide context or reference, but not to make determinations based on their occurrence analyses.

Table II.A.3.a. summarizes results from the state data review. The table presents the data availability and data quality parameters assessed for 57 primacy entities considered under SDWA: the 50 states, 5 territories, the District of Columbia, and an aggregate entry for the Native American tribes. Contained in URCIS are data for 38 states, the Virgin Islands, and Washington, D.C. No data were reported for 17 primacy entities. An assessment of several parameters is used to determine if a state's data are complete (or adequately complete), or incomplete and biased. Indicators of biased data are high percent samples with detections (generally greater than 5 to 8 %), low number of samples per PWS (significantly below the common range of 50 to 250 samples per PWS), and low number of PWSs per state (as compared to the number of PWSs listed for a state in the SDWIS/FED inventory).

The last column on Table II.A.3.a lists states with data records that are not complete (i.e., less than 100% of systems reported as compared to SDWIS/FED inventory listings), but have other parameters (e.g., "Percent Sample Detections", or "Samples per PWS") that suggest that the data are balanced and perhaps complete for the systems that did report. The last two columns, "States Usable for Cross-Section," identify the 27 primacy entities with adequate and unbiased data that were further considered for occurrence analyses.

Table II.A.3.a. Summary of Data Quantity and Quality in URCIS (Round 1) for the States, Tribes, and Territories.

	States/ Tribes/ Territories	Total Unique PWSs	Percent Sample Detections	Samples per PWS	No Data in Database	Data sets with 100% Detects	Significantly Too Few Systems	States Usable for Cross-Section	
								Most Complete Data sets	Incomplete but Adequate Data sets
1	Alabama	152	5%	136					Alabama
2	Alaska	748	2%	132				Alaska	
3	*American Samoa*	-			*American Samoa*				
4	Arizona	973	1%	151				Arizona	
5	Arkansas	6	100%	5		Arkansas			
6	California	4,167	7%	111				California	
7	Colorado	60	34%	38			Colorado		
8	Connecticut	-			Connecticut				
9	Delaware	13	6%	1,207			Delaware		
10	Florida	855	20%	14					Florida
11	Georgia	1,165	2%	120				Georgia	
12	*Guam*	-			*Guam*				
13	Hawaii	127	1%	370				Hawaii	

	States/ Tribes/ Territories	Total Unique PWSs	Percent Sample Detections	Samples per PWS	No Data in Database	Data sets with 100% Detects	Significantly Too Few Systems	States Usable for Cross-Section	
								Most Complete Data sets	Incomplete but Adequate Data sets
14	Idaho	-			Idaho				
15	Illinois	1,307	5%	147				Illinois	
16	Indiana	415	4%	292				Indiana	
17	Iowa	1,002	5%	62				Iowa	
18	Kansas	-			Kansas				
19	Kentucky	525	3%	273				Kentucky	
20	Louisiana	13	3%	95			Louisiana		
21	Maine	-			Maine				
22	*Marianna Islands*	-			*Marianna Islands*				
23	Maryland	998	2%	105				Maryland	
24	Massachusetts	220	91%	14		Massachusetts			
25	Michigan	139	100%	16		Michigan			
26	Minnesota	1,565	1%	100				Minnesota	
27	Mississippi	206	100%	6		Mississippi			
28	Missouri	85	1%	215			Missouri		
29	Montana	565	2%	94				Montana	
30	Nebraska	214	100%	6		Nebraska			
31	Nevada	10	2%	860			Nevada		
32	New Hampshire	201	100%	5		New			
33	New Jersey	1,551	2%	94				New Jersey	
34	New Mexico	617	0%	151				New Mexico	
35	New York	357	1%	348					New York
36	North Carolina	298	2%	134					North
37	North Dakota	-			North Dakota				
38	Ohio	2,657	1%	313				Ohio	
39	Oklahoma	-			Oklahoma				
40	Oregon	-			Oregon				
41	Pennsylvania	-			Pennsylvania				
42	*Puerto Rico*	-			*Puerto Rico*				
43	Rhode Island	-			Rhode Island				
44	South Carolina	-			South Carolina				
45	South Dakota	335	4%	52				South Dakota	
46	Tennessee	306	4%	197				Tennessee	
47	Texas	124	98%	2		Texas			
48	*Tribes*	-			*Tribes*				
49	Utah	430	1%	150				Utah	
50	Vermont	133	82%	10		Vermont			
51	*Virgin Islands*	3	9%	186					*Virgin*
52	Virginia	-			Virginia				
53	Washington	992	1%	229				Washington	
54	Washington, D.C.	1	5%	3,432				Washington,	
55	West Virginia	139	6%	157					West
56	Wisconsin	-			Wisconsin				
57	Wyoming	145	3%	125				Wyoming	
	TOTAL	**23,819**	**2.9%**	**146**	**17**	**8**	**5**	**21**	**6**

II.B. SDWIS/FED (Round 2) Data

The monitoring data for the UCM (1993) list of unregulated contaminants (from Round 2, approximately 1992-1997) are reviewed in this section of the summary. These Round 2 data were derived from the Safe Drinking Water Information System/Federal Version (SDWIS/FED). Significant data review, formatting, and data quality checking and editing were required of this Round 2 data to enable the evaluations and analyses conducted for this contaminant occurrence assessment.

II.B.1. Description of Data

Data for this portion of the analysis were downloaded from the SDWIS/FED database. The unregulated data include records from the second round of unregulated contaminant monitoring (referred to as "Round 2") that were submitted directly into SDWIS/FED.

These data were generated through monitoring conducted during Round 2 of required unregulated contaminant monitoring initiated in 1993. (Although second round monitoring was formally initiated in 1993, SDWIS/FED (Round 2) data can include older data that are comparable to, but predate, the formal second round monitoring.) SDWIS/FED contained Round 2 data from 35 states/primacy entities. The SDWIS/FED (Round 2) data includes information on 48 contaminants, including: 1 IOC, 13 SOCs, 20 mandatory VOCs, and 14 discretionary VOCs.

II.B.2. Data Management and Data Quality

The SDWIS/FED Round 2 data comprise 4,350,874 raw records. An important and substantial component of this study consisted of the detailed and extensive review of these data records for numerous data quality considerations including reporting consistencies, uniform and valid coding, data completeness, correct and consistent use of analytical units, and any inherent bias in the raw records. Common types of data problems that were addressed include records with invalid contaminant codes, systems with unknown source water or system type codes, state records for specific contaminants that reported only detections, or entire state records that appeared to have extremely and consistently low analytical results. These types of records were either deleted (such as when water source or system type codes were invalid) or converted (when a data units conversion appeared straightforward).

Another more general data management decision related to data from transient and "non-public" water systems. To avoid the problems associated with transient sources in exposure studies, systems with a system type recorded as "NC" (non-community, meaning transient) were not included in the occurrence analyses. With these data management and quality improvements, the initial 4,350,874 analytical records decreased to 4,211,446 analytical records (which includes approximately 900,000 records with converted units).

II.B.3. Further Data Review and Editing

Subsequent to the initial editing and filtering of the data described above, a basic analysis of the 4.21 million records was undertaken. Similar to the URCIS (Round 1) data, various descriptive statistics were compiled, by state, to enable a further, more detailed data review to assess data bias and representativeness. Some state data, as will be described, are so incomplete that their use would introduce bias into the analyses. These data are used in certain parts of this report to provide context or reference, but not to make determinations based on their occurrence analyses.

Table II.B.3.a summarizes some key results from the Round 2 state data review. The table presents the data availability and data quality parameters assessed for the 57 primacy entities considered under SDWA. Of the 57 primacy entities in SDWIS/FED, 35 have reported Round 2 data and 22 have not. An assessment of several parameters is used to determine if a state's data are complete (or adequately complete), or incomplete and biased. Indicators of biased data are high percent samples with detections (generally greater than 5 to 8%), low number of samples per PWS (significantly below the common range of 50 to 250 samples per PWS), and low number of PWSs per state (as compared to the number of PWSs listed for a state in the SDWIS/FED inventory).

The last column on Table II.B.3.a, "States Usable for Cross-Section," lists states with data records that are reasonably balanced and perhaps complete for the systems that did report. These 20 Round 2 primacy entities with adequate and unbiased data were further considered for occurrence analyses.

Table II.B.3.a. Summary of Data Quantity and Quality in SDWIS/FED (Round 2) for the States, Tribes, and Territories.

	State/ Tribes/ Territories	Total Unique PWSs	Percent Sample Detections	Samples per PWS	No Data in Database	Data sets with 100% Detects	Significantly Too Few Systems	Data Quality Problems	States Usable for Cross-Section
1	Alabama	314	94.08%	2		Alabama			
2	Alaska	625	3.10%	194					Alaska
3	*American Samoa*	-			*American Samoa*				
4	Arizona	123	2.75%	55			Arizona		
5	Arkansas	577	7.29%	118					Arkansas
6	California	67	6.75%	44			California		
7	Colorado	833	3.72%	143					Colorado
8	Connecticut	87	4.53%	921			Connecticut		
9	Delaware	-			Delaware				
10	Florida	-			Florida				
11	Georgia	-			Georgia				
12	*Guam*	-			*Guam*				
13	Hawaii	-			Hawaii				
14	Idaho	-			Idaho				
15	Illinois	-			Illinois				
16	Indiana	120	2.26%	58			Indiana		
17	Iowa	-			Iowa				
18	Kansas	-			Kansas				
19	Kentucky	445	7.50%	125					Kentucky
20	Louisiana	1,394	0.00%	118				Louisiana	
21	Maine	745	0.89%	163					Maine
22	*Marianna Islands*	-			*Marianna Islands*				
23	Maryland	1,015	0.62%	140					Maryland
24	Massachusetts	506	3.12%	125					Massachusetts
25	Michigan	3,209	7.26%	97					Michigan
26	Minnesota	1,581	1.66%	198					Minnesota
27	Mississippi	1,155	71.27%	4		Mississippi			
28	Missouri	1,434	6.08%	109					Missouri
29	Montana	-			Montana				
30	Nebraska	-			Nebraska				
31	Nevada	-			Nevada				
32	New Hampshire	849	5.45%	23					New
33	New Jersey	17	2.32%	28			New Jersey		
34	New Mexico	755	0.75%	277					New Mexico

	State/ Tribes/ Territories	Total Unique PWSs	Percent Sample Detections	Samples per PWS	No Data in Database	Data sets with 100% Detects	Significantly Too Few Systems	Data Quality Problems	States Usable for Cross-Section
35	New York	-			New York				
36	North Carolina	2,263	2.05%	55					North
37	North Dakota	296	7.73%	59					North Dakota
38	Ohio	2,259	3.45%	291					Ohio
39	Oklahoma	888	3.99%	180					Oklahoma
40	Oregon	1,168	1.66%	75					Oregon
41	Pennsylvania	1,424	10.19%	16				Pennsylvania	
42	*Puerto Rico*	-			*Puerto Rico*				
43	Rhode Island	117	0.30%	136					Rhode Island
44	South Carolina	1,047	0.33%	147				South Carolina	
45	South Dakota	27	2.34%	40			South Dakota		
46	Tennessee	78	9.31%	147			Tennessee		
47	Texas	4,863	1.23%	124					Texas
48	*Tribes*	26	1.22%	57			Tribes		
49	Utah	-			Utah				
50	Vermont	636	2.65%	74				Vermont	
51	*Virgin Islands*	-			*Virgin Islands*				
52	Virginia	-			Virginia				
53	Washington	2,680	2.23%	123					Washington
54	Washington, D.C.	-			Washington, D.C.				
55	West Virginia	-			West Virginia				
56	Wisconsin	225	1.41%	51			Wisconsin		
57	Wyoming	-			Wyoming				
	TOTAL	**33,848**	**2.95%**	**124**	**22**	**2**	**9**	**4**	**20**

III. DEVELOPING A NATIONALLY REPRESENTATIVE PERSPECTIVE

The data quality evaluation suggested that Round 1 data from 25 states (plus Washington, D.C. and the Virgin Islands, totaling 27 primacy entities) were most complete and might be used to generate national summary statistics on occurrence of the contaminants in URCIS. Data from 25 of the 50 states is a substantial sample. However, even a 50 percent sample does not guarantee that the sample is representative because the data were not collected in a systematic or random statistical framework. Therefore, the state data were evaluated to assess how representative they were across the range, from high to low, of likely contaminant occurrence and across the spatial/hydrologic diversity of the nation. Based on these assessments, the construction of a cross-section of states from the available state data sets provides a reasonable representation of national occurrence.

There are many sophisticated statistical methods that can be applied to analyze limited (and biased) data. This development of a representative cross-section of data is undertaken to support this initial occurrence analysis. The representative cross-section can also serve as the basis for subsequent, more sophisticated analyses as deemed necessary and appropriate by the initial occurrence assessments conducted in this report. For this initial analysis, the approach used was developed for the CMR report, *A Review of Contaminant Occurrence in Public Water Systems* (EPA 816-R-99-006, 1999), to establish a national cross-section from state SDWA contaminant databases. This approach was supported by peer reviewers and by stakeholders as providing a clear, repeatable, and understandable approach. It cannot provide a "statistically representative" sample, because the data were not selected in an appropriate fashion. The resultant data should, however, provide a clear indication of the central tendency of the national data.

III.A. Methods

For the CMR Report (referenced above), a protocol was developed for determining a representative cross-section of states for occurrence analysis. In the CMR analysis, contaminant data were available directly from 14 states. The state data were evaluated for completeness and quality (similar to the data quality evaluations in this report). The balance of the states with adequately complete and high quality data were evaluated to establish a national cross-section. In the CMR process, eight states were selected for use in a national analysis as providing the best data quality and completeness, and for providing a balanced national cross-section of occurrence data. The CMR process was based on evaluating the states' pollution potential and geographic coverage in relation to all states. The URCIS and SDWIS/FED states were evaluated using the same selection process.

Two broad factors were considered in the assessment of a representative cross-section: pollution potential and geographic or spatial diversity. Pollution potential is considered to ensure that the selection of cross-section states represents the range of likely high, medium, and low contaminant occurrence. Geographic consideration is included so that the wide range of climatic and hydrogeologic conditions across the United States are represented, again balancing the varied conditions that affect transport and fate of contaminants.

For this analysis, two primary pollution potential indicators were used to evaluate the representativeness of the states. One factor indicates the pollution potential from manufacturing (generally related to VOC occurrence) and the second factor refers to pollution potential from agriculture (generally related to SOC occurrence). States were ranked from 1 to 50 for each factor and divided into quartiles based on the ranking. The rankings were reviewed to assess if states could be selected in approximate balance from each quartile.

III.A.1. Manufacturing Indicators

Numerous factors were considered in the CMR analysis as potential indicators of manufacturing-related pollution, including EPA's Toxic Release Inventory (TRI), the number of manufacturing establishments, the number of manufacturing establishments per square mile, the number of manufacturing employees, the product value added by manufacturers, and the value added per capita. These factors were each considered in terms of their inherent value as pollution potential indicators, their range and variance (in providing a relative ranking of the states), their inter-relationships, and consistency in data collection. Based on these considerations, the number of manufacturing establishments per square mile was used as the primary indicator for potential VOC pollution.

III.A.2. Agricultural Indicators

There is no complete measure of pesticide usage by states which is readily available. Therefore, a variety of factors were considered to assess potential synthetic organic chemical pollution from agriculture in each state. These included the percent of the state's population that is classified as rural, the percent of land in the state that is crop land, the percent of land that is grassland pasture and rangeland (a possible inverse indicator), and total farm agricultural chemical expenses. Like the manufacturing factors, these agricultural variables were considered in terms of their value in indicating potential sources of pollution and were plotted against one another to determine how closely they are related. Of these factors, total farm agricultural chemical expenses was considered to be the most direct indicator of potential pollution for SOCs.

III.B. Representative Cross-Section of States

Using the method and indicators described above, state cross-sections are developed from the states with unbiased, complete, and relatively good quality data in URCIS and SDWIS/FED. The cross-section states were selected to provide a relatively balanced distribution of pollution potential and geography, so that the cross-sections approximate a representative national distribution.

III.B.1. URCIS 24-State Cross-Section

Table III.B.1 summarizes the state pollution potential rankings, highlighting those included in URCIS. Although data from 38 states (and Washington D.C. and Virgin Islands), are included in URCIS, not all states were usable in a "representative" cross-section (as discussed in Section II). Thirteen states contained only detections or too few analytical records, or records from too few PWSs and were eliminated from consideration because of their inherent bias. The data from Washington, D.C. and Virgin Islands were excluded from this state-level analysis because it was difficult to evaluate them in relation to complete state data. The data quality screening left 25 states eligible for the national cross-section. New York was excluded because of inherent data quality problems, leaving 24 states.

Table III.B.1. Ranking of States based on Number of Manufacturing Establishments per Square Mile. URCIS (Round 1) 24 State Cross-Section in Bold.

State	Ranking of the Number of Manufacturing Establishments/ Sq. Mile	Ranking of the Total Farm Ag. Chemical Expenses
Rhode Island	1	49
New Jersey	**2**	**37**
Connecticut	3	45
Massachusetts	4	43
New York	5	28
Ohio	**6**	**11**
Maryland	**7**	**35**
Pennsylvania	8	29
Delaware	9	39
Illinois	**10**	**2**
California	**11**	**1**
Florida	**12**	**4**
Michigan	13	18
New Hampshire	14	48
Indiana	**15**	**7**
North Carolina	**16**	**17**
Wisconsin	17	20
Tennessee	**18**	**24**
Georgia	**19**	**19**
Virginia	20	30
South Carolina	21	32
Hawaii	**22**	**36**
Vermont	23	47
Washington	**24**	**14**
Alabama	**25**	**26**
Missouri	26	12
Kentucky	**27**	**27**
Minnesota	**28**	**5**
Louisiana	29	13
Texas	30	6
Mississippi	31	8
Arkansas	32	10

State	Ranking of the Number of Manufacturing Establishments/ Sq. Mile	Ranking of the Total Farm Ag. Chemical Expenses
West Virginia	**33**	**44**
Oregon	34	22
Maine	35	38
Iowa	**36**	**3**
Oklahoma	37	33
Colorado	38	31
Kansas	39	16
Arizona	**40**	**25**
Utah	**41**	**42**
Nebraska	42	9
Idaho	43	23
New Mexico	**44**	**40**
South Dakota	**45**	**21**
Nevada	46	46
North Dakota	47	15
Montana	**48**	**34**
Wyoming	**49**	**41**
Alaska	**50**	**50**
	1=highest	*1=highest*

All 50 states are ranked based on the number of manufacturing establishments per square mile. Each state's rank in total farm agricultural chemical expenses is also indicated. The 38 states in shaded rows are the states with data in the URCIS (Round 1) database. The 24 states in bold are the selected URCIS (Round 1) cross-section states. Ranking quartiles are indicated by bold lines.

Figure III.B.1.a. summarizes the representativeness of the pollution potential distribution across the ranking quartiles of the 24 cross-section states. Figure III.B.1.b. shows the geographic distribution of these 24 cross-section states (and of the 26 excluded states). The consideration of a broad and diverse geographic representation of states serves to address and include the potential range of naturally occurring contaminants as represented by the inorganic chemicals, IOCs. As illustrated, the 24 states are quite well distributed based on pollution potential indicators, with a uniform distribution from high to low potential for both key pollution indicators (Figure III.B.1.a.). While geographic coverage is lacking from the south-central U.S. and New England, the 24 cross-section states provide broad coverage from around the country, from the major climatic regions, and include about 49% of the PWSs nationally and about 56% of population served by PWSs.

Figure III.B.1.a. Distribution of State Rankings for Manufacturing Establishments / Sq. Mile vs. Farm Ag. Chemical Expenses.
Highlighting URCIS (Round 1) 24 Cross-Section States

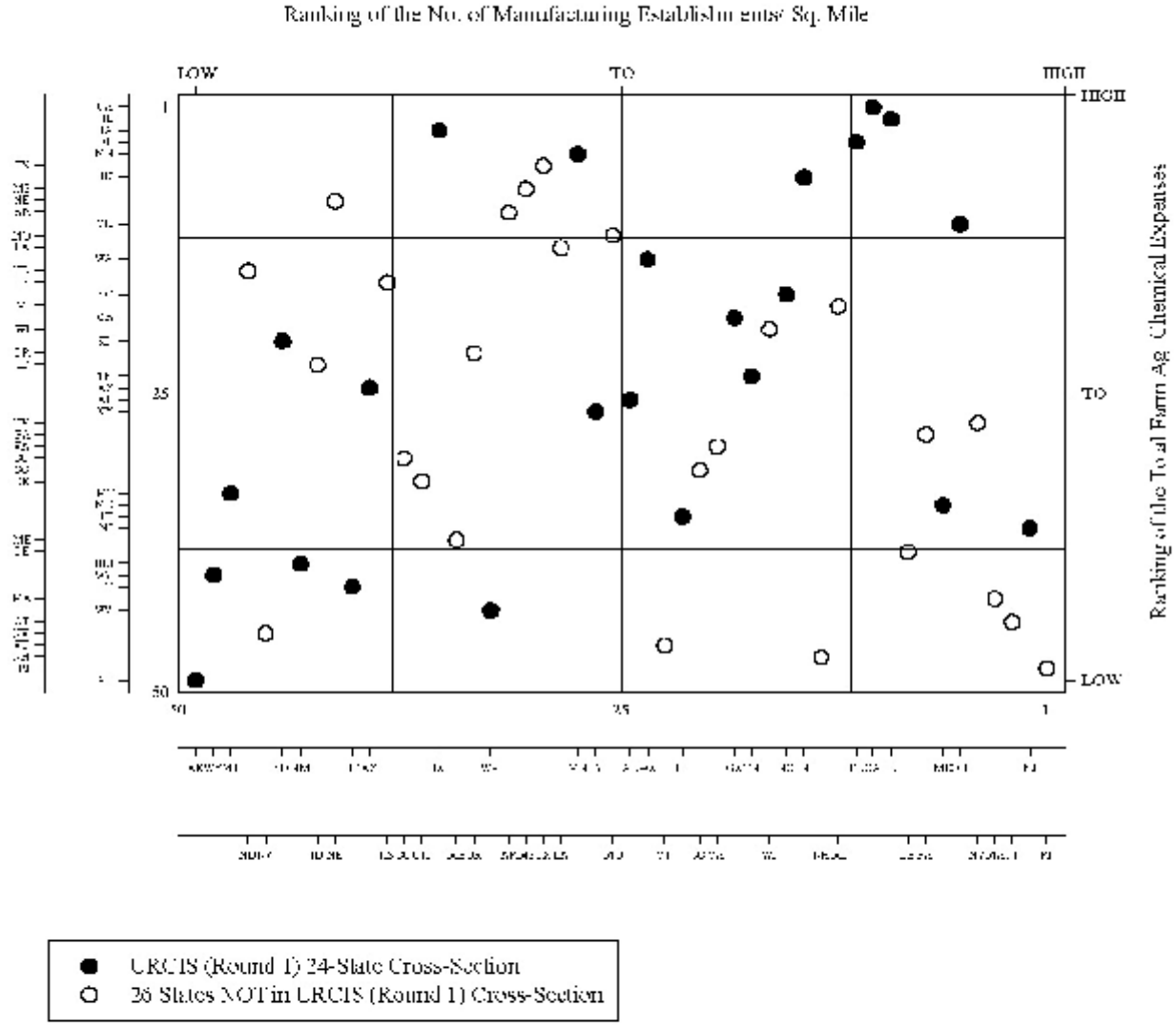
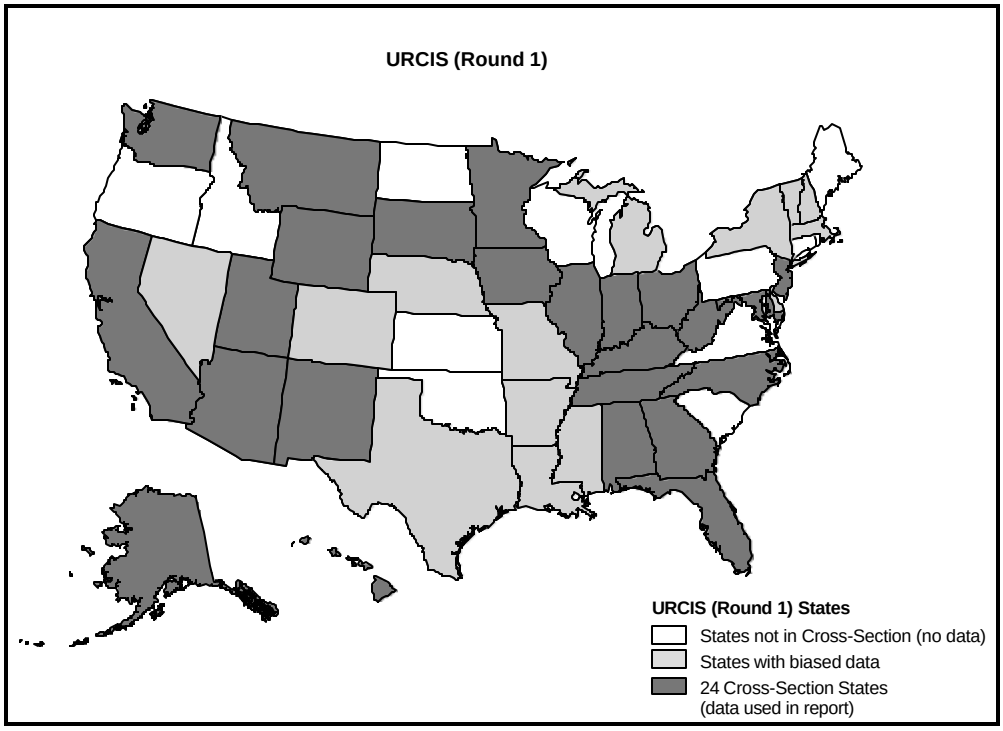


Figure III.B.1.b. 24 URCIS (Round 1) Representative Cross-Section States and States Not Included in the Cross-Section



In sum, the group of 24 cross-section states in URCIS (Round 1), should provide a balanced representation, based on relative rankings for pollution potential (i.e., potential for contaminant occurrence), geographic coverage, and data quality and completeness. The 24 cross-section state distribution across pollution potential quartiles suggests that they should provide a valid indication of the potential range and occurrence of contamination in public water systems nationally.

The data from the 24-state cross-section are used to compute aggregate contaminant occurrence measures as an approximation of a national cross-section. While the data from these cross-section states cannot be stated to be "statistically representative," their distribution should provide a representative view and clear indication of national central tendency of occurrence.

In addition, the URCIS data, with 24 states in its cross-section, represent a relatively large collection of state data for a cross-section. As noted, the CMR analysis developed a cross-section of 8 states. The data from the URCIS 24 cross-section states can also be used to evaluate and illustrate this approach to constructing a national cross section by evaluating the data in aggregate steps, using increments of the 24 states. This approach is described below.

III.B.2. Incremental National Cross-Sections

The data from the 24 URCIS cross-section states were used to build "incremental" national cross-sections, by aggregating subsets of the 24 states using the same selection protocol for evaluating representativeness. Each aggregate (e.g., 4 states, 8 states, etc.) provides some representation of all quartiles of pollution potential indicators, a geographic balance, and, hence, hopefully, a balance in potential occurrence. The data from the states in each aggregate were used to compute group contaminant occurrence measures (such as percent systems with at least one analytical detection of a particular contaminant). The results from the 4-state, 8-state, and 13-state cross-section (data aggregations) were then compared to the same measures based on the 24-state cross-section.

The 8-state through the 24-state cross-sections provide comparable results. This consistency of analytical results across the different number of state cross-section groups suggests that the criteria used to construct the aggregations are valid. Again, while the data from these cross-section states cannot be stated to be "statistically representative," their distribution should provide a clear indication of national central tendency of occurrence. The results using the 24-state cross-section will be further described in later sections of this report. The validity and value of the national cross-section sample could be further tested if necessary.

III.B.3. SDWIS/FED 20-State Cross-Section

Table III.B.3. summarizes the pollution potential rankings for the 50 states, highlighting (in bold) those included in SDWIS/FED. Although a total of 34 state data sets are included in SDWIS/FED Round 2 data, not all states were usable in constructing a "representative" cross-section (as discussed in Section II). The data quality screening left 20 states eligible for the national cross-section. In Figure III.B.3.a, the distribution of the pollution potential rankings of the 20 cross-section states illustrates how representative the cross-section states are as based on these characteristics.

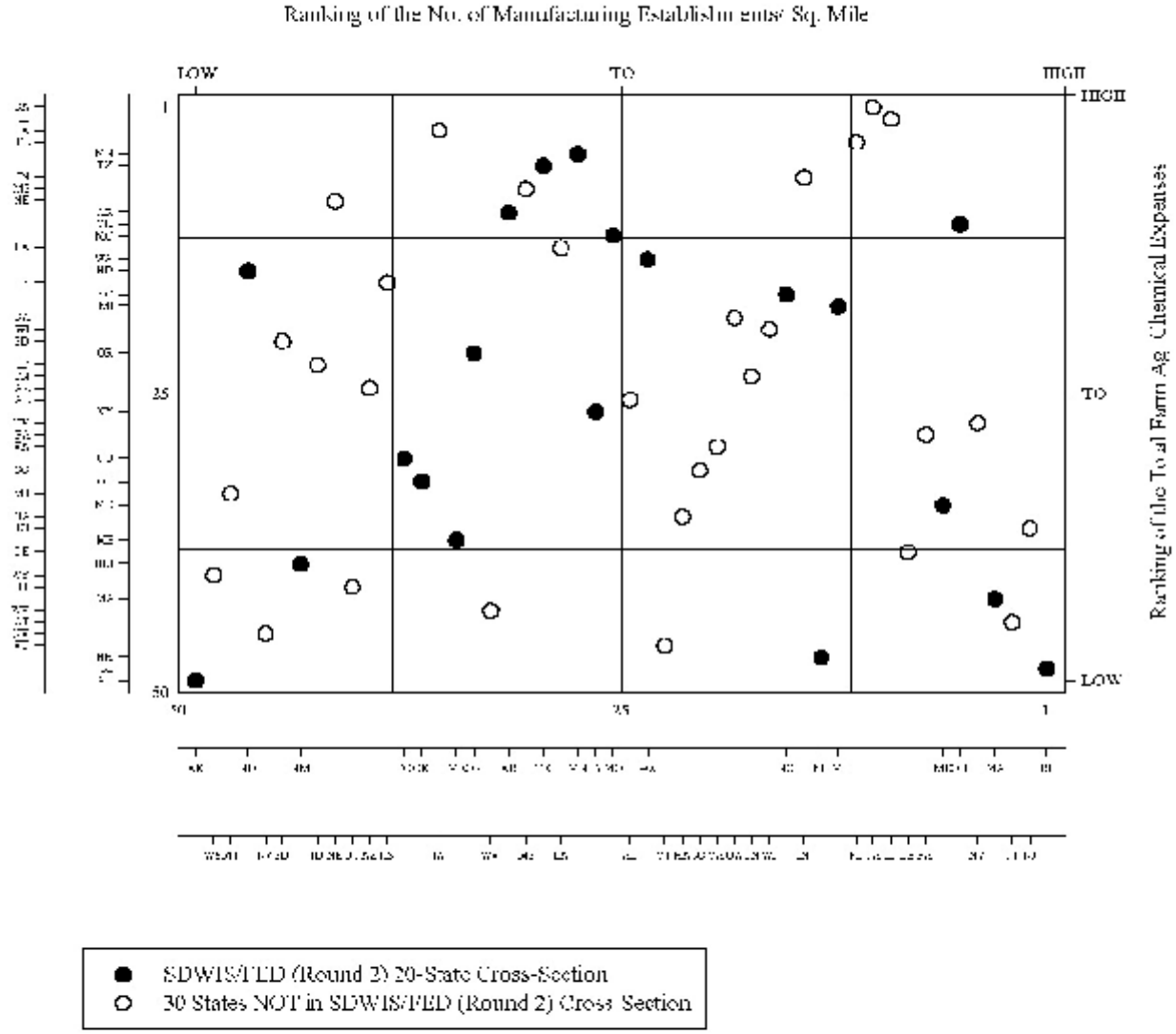
Table III.B.3. Ranking of States based on Number of Manufacturing Establishments per Square Mile. SDWIS/FED (Round 2) 20 Cross-Section States in Bold.

State	Ranking of the Number of Manufacturing Establishments/ Sq. Mile	Ranking of the Total Farm Ag. Chemical Expenses
Rhode Island	**1**	**49**
New Jersey	2	37
Connecticut	3	45
Massachusetts	**4**	**43**
New York	5	28
Ohio	**6**	**11**
Maryland	**7**	**35**
Pennsylvania	8	29
Delaware	9	39
Illinois	10	2
California	11	1
Florida	12	4
Michigan	**13**	**18**
New Hampshire	**14**	**48**
Indiana	15	7
North Carolina	**16**	**17**
Wisconsin	17	20
Tennessee	18	24
Georgia	19	19

State	Ranking of the Number of Manufacturing Establishments/ Sq. Mile	Ranking of the Total Farm Ag. Chemical Expenses
Virginia	20	30
South Carolina	21	32
Hawaii	22	36
Vermont	23	47
Washington	**24**	**14**
Alabama	25	26
Missouri	**26**	**12**
Kentucky	**27**	**27**
Minnesota	**28**	**5**
Louisiana	29	13
Texas	**30**	**6**
Mississippi	31	8
Arkansas	**32**	**10**
West Virginia	33	44
Oregon	**34**	**22**
Maine	**35**	**38**
Iowa	36	3
Oklahoma	**37**	**33**
Colorado	**38**	**31**
Kansas	39	16
Arizona	40	25
Utah	41	42
Nebraska	42	9
Idaho	43	23
New Mexico	**44**	**40**
South Dakota	45	21
Nevada	46	46
North Dakota	**47**	**15**
Montana	48	34
Wyoming	49	41
Alaska	**50**	**50**
	1=highest	*1=highest*

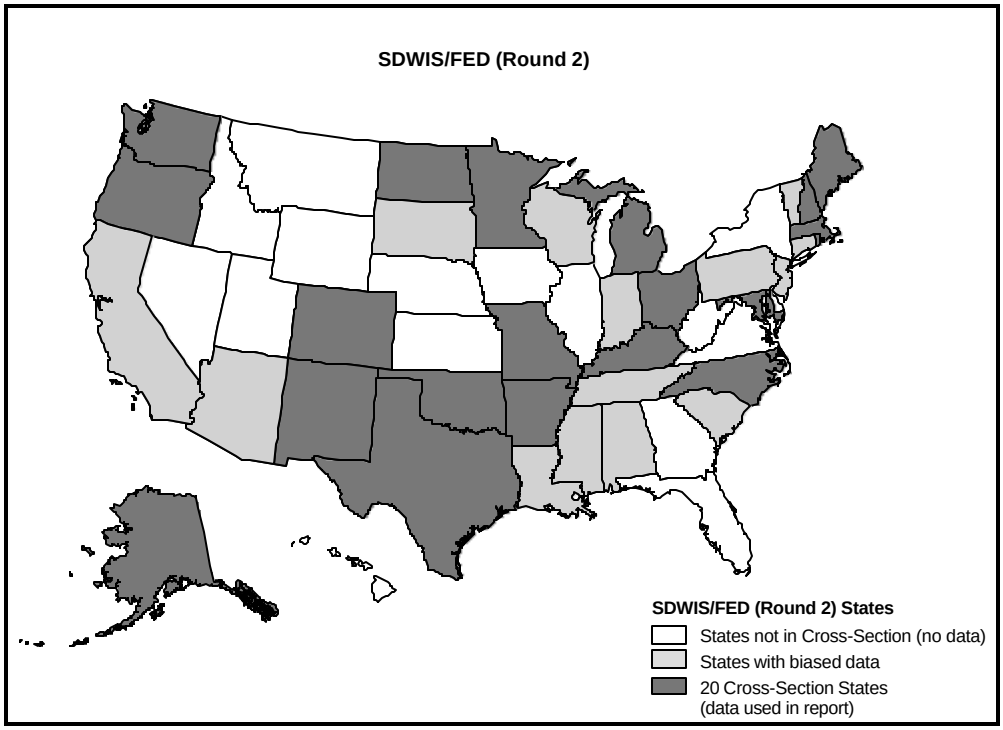
All 50 states are ranked based on the number of manufacturing establishments per square mile. Each state's rank in total farm agricultural chemical expenses is also indicated. The 34 states in shaded rows are the states with data in the SDWIS/FED database. The 20 states in bold are the selected SDWIS/FED (Round 2) cross-section states. Ranking quartiles are indicated by bold lines.

Figure III.B.3.b. Distribution of State Rankings for Manufacturing Establishments / Sq. Mile vs. Farm Ag. Chemical Expenses.
Highlighting SDWIS/FED (Round 2) 20 Cross-Section States



The geographic distribution of the 20 SDWIS/FED Round 2 cross-section states is presented in Figure III.B.3.b. Geographically, the 20 Round 2 cross-section states are widely distributed across the country. Although coverage is perhaps sparse in the south-east and along the western slope of the Rocky Mountains, every major geographic region has some state representation.

Figure III.B.3.b. 20 SDWIS/FED (Round 2) Cross-Section States and States Not Included in the Cross-Section



IV. DATA COVERAGE FOR THE NATIONAL OCCURRENCE OF CONTAMINANTS IN DRINKING WATER

IV.A. URCIS (Round 1) Data Coverage

A descriptive overview of the Round 1 data is presented to provide additional insight and perspective on the results. After data management and editing, 3.45 million records were available for analysis representing over 24,000 PWSs from the 40 states/entities. For the 24 states comprising the URCIS representative cross-section (see Section III for a discussion regarding the cross-section), the analytical results total is 3.27 million records, from 22,034 PWSs.

Of the approximately 22,000 systems with data represented in the cross-section states, about 88% are classified as ground water and 12% as using surface water. Approximately 65% of the cross-section systems are categorized as Community Water Systems (CWSs), 22% Non-Transient Non-Community

Water Systems (NTNCWS), about 8% Non-Community Water Systems (NCWS), and 5% with unknown system type designations.

The majority of data were collected during the 1987-1992 compliance cycle, with a peak of data collection in 1991. Although in the month of March there is a slightly greater percentage of data, there is no significant difference in the number of records from month to month, suggesting that there should be no seasonal bias due to monthly differences in reporting.

IV.B. SDWIS/FED (Round 2) Data Coverage

After initial data management and editing, 4.21 million records were available for analysis from over 33,000 PWSs in the 35 states/entities. The 20 SDWIS/FED Round 2 state cross-section totals 3.69 million records from slightly more than 27,000 PWSs. The Round 2 cross-section states, therefore, contain nearly 88% of all Round 2 state contaminant occurrence data in SDWIS/FED.

Of the approximately 27,000 systems with data represented in the Round 2 cross-section states, about 89% are classified as ground water and 11% as using surface water. These source water percentages are essentially the same for the entire Round 2 data set for all 35 states/entities. Approximately 70% of the cross-section systems are categorized as Community Water Systems (CWSs), and 30% as Non-Transient Non-Community Water Systems (NTNCWS). This proportional distribution of system types is very similar to that for all the Round 2 data.

The majority of data were collected during 1992-1997, with a peak of data collection in 1995. Although there is a very slightly greater percentage of data in March, a fairly uniform distribution of occurrence data by month suggests that there should be no inherent seasonal bias in the data.

IV.C. Comparing Data Coverage of URCIS (Round 1) and SDWIS/FED (Round 2)

The URCIS (Round 1) and SDWIS/FED (Round 2) data were evaluated to determine if comparable states, public water systems (PWSs), and contaminants are contained in both databases. As previously noted, URCIS contained data from 40 states/territories, and SDWIS/FED data consisted of analytical results from 35 states/territories.

Of the 25 states with data in both URCIS (Round 1) and SDWIS/FED (Round 2), only 8 were determined to be sufficiently complete for use in this comparison analysis. Alaska, Kentucky, Maryland, Minnesota, North Carolina, New Mexico, Ohio, and Washington were contained in both databases and have data of adequate quality for analyses and comparisons.

In addition, a determination was made regarding actual PWSs that are common to both databases. Thirty-one percent of all PWSs in URCIS (Round 1) are also in SDWIS/FED (Round 2), while only 22% of all SDWIS/FED (Round 2) PWSs are common to both rounds. This is, in part, because there are many more systems reporting analytical results in SDWIS/FED (Round 2) than in URCIS (Round 1).

Comparisons of contaminants in URCIS (Round 1) and SDWIS/FED (Round 2) indicated that there were no common IOCs (Group 1) or SOCs (Regulated or Group 2) reported in both databases. In contrast, all of the unregulated Group 3 and Group 4 VOCs reported in SDWIS/FED (Round 2) were also reported in URCIS (Round 1). None of the regulated VOCs reported in URCIS (Round 1), however, were reported in SDWIS/FED (Round 2).

Changes in the percentages of samples and percentage of PWSs with at least one analytical result greater than the MRL followed no consistent pattern either for the contaminants or states with data in both rounds. The percentage of PWSs with at least one analytical result exceeding the concentration of the MCL/HRL (or ½ MCL/HRL) also followed no apparent or consist pattern between URCIS (Round 1) and SDWIS/FED (Round 2).

IV.D. Comparing Data Coverage Across Systems Sizes and Types

Data for select contaminants were also evaluated based on system type and size. Both the URCIS (Round 1) and SDWIS/FED (Round 2) data were reviewed according to system size (with the data stratified and assessed according to the five standard population-served categories) and according to type (comparing community water systems and non-transient non-community water systems).

Generally, for both Round 1 and 2 data, the percentage of public water systems with analytical results greater than the MRL and the MCL/HRL increases as the system size (population-served) increases. Also, it appears to generally be the case that the percentage of public water systems with analytical results greater than the MRL and the MCL/HRL is greater for community water systems than for non-transient non-community water systems. Note that there is a much greater number of CWSs than NTNCWSs in the databases.

V. ANALYSIS OF NATIONAL OCCURRENCE

In this section, general summaries of contaminant occurrence data from URCIS (Round 1) and SDWIS/FED (Round 2) are presented. The summary data developed for the occurrence assessments in this report are presented in detail in Appendices A, B, C, and D in the complete National Occurrence report. Appendix A contains summary tables for the 62 URCIS (Round 1) contaminant data. Appendix B contains summary tables for the 48 SDWIS/FED (Round 2) contaminant data. In Appendix C, data coverage comparisons between URCIS (Round 1) and SDWIS/FED (Round 2) data are presented for select states and contaminants. Data summaries of select contaminants by system type and population-served for both URCIS (Round 1) and SDWIS/FED (Round 2) data are presented in Appendix D of the complete National Occurrence report. A brief review of these findings is included the following sections of this national summary.

V.A. URCIS (Round 1) Contaminant Occurrence

Table V.A.1 summarizes the occurrence data of the URCIS (Round 1) 24 state cross-section for 62 contaminants. The table presents the total number of unique public water systems, the percent of public water systems with at least one monitoring sample analytical result greater than the MRL, the percent of public water systems with at least one result greater than the estimated MCL/HRL/HAL and, finally, the 99th percentile value in micrograms per liter (Fg/L). (To review a map of the URCIS Round 1 cross-section states, refer to Figure III.B.1.b.)

The 24 URCIS cross-section states reflect significant national coverage: these states contain approximately 44% of public water systems nationally and 51% of the population served by public water systems. For the majority of contaminants evaluated here (35 out of 62), less than 1% of public water systems in the cross-section states have analytical detections (any sample analytical result greater than the MRL). Another 16 contaminants are detected in 1 to 2% of public water systems, as evidenced by one or more sample analytical results greater than the MRL. Seven contaminants

(Dibromochloropropane, Dichloromethane, Tetrachloroethylene, Toluene, 1,1,1-Trichloroethane, Trichloroethylene, and total Xylenes) are detected in 2 to 4% of public water systems, as evidenced by one or more sample analytical results greater than the MRL. The four THMs have a considerably higher percent of systems (ranging from 9.01% to 28.84%) with at least one sample analytical result greater than the MRL. Select URCIS (Round 1) high occurrence contaminants are identified and assessed in Section VI.

Table V.A.1. URCIS (Round 1) 24-State Cross-Section Summary of Occurrence

CHEMICAL NAME (Threshold in µg/L)	Total # PWS	# GW PWS	# SW PWS	% PWS > MRL	% GW PWS > MRL	% SW PWS > MRL	% PWS > Threshold	% GW PWS > Threshold	% SW PWS > Threshold	99% Value (µg/L)
SOCs										
Dibromochloropropane (MCL=0.2)	12,827	11,446	1,511	2.49%	2.51%	2.32%	1.32%	1.35%	0.99%	1.03
Ethylene Dibromide[1] (MCL=0.05)	11,450	10,274	1,284	1.14%	1.01%	2.10%	0.16%	0.12%	0.47%	0.01
VOCs										
Benzene (MCL=5)	14,910	13,919	1,119	1.14%	1.11%	5.18%	0.25%	0.25%	0.27%	< 2.0
Bromobenzene (N/A)	16,450	14,862	1,726	0.19%	0.14%	0.64%	N/A			< 2.0
Bromochloromethane (MCL=10)	12,881	11,576	1,386	0.50%	0.44%	1.08%	0.03%	0.03%	0.07%	< 1.0
Bromodichloromethane (HRL=60)	20,024	17,917	2,324	22.09%	14.84%	79.69%	0.13%	0.04%	0.86%	22.00
Bromoform (HRL=400)	19,582	17,773	1,979	9.01%	7.56%	22.13%	0.01%	0.01%	0.00%	7.32
Bromomethane (MCL=10)	20,198	18,472	1,886	0.77%	0.71%	1.22%	0.09%	0.08%	0.16%	< 4.0
Carbon Tetrachloride (MCL=5)	15,266	14,176	1,214	1.32%	1.09%	3.95%	0.16%	0.15%	0.25%	1.60
Chlorobenzene (MCL=100)	20,038	18,337	1,859	0.53%	0.26%	3.17%	0.00%	0.00%	0.00%	< 1.0
Chloroethane (N/A)	20,236	18,507	1,882	0.39%	0.29%	1.33%	N/A			< 2.0
Chloroform (HRL=600)	20,039	17,874	2,385	28.84%	21.69%	84.40%	0.02%	0.01%	0.17%	87.00
Chloromethane (MCL=3)	20,246	18,513	1,894	1.22%	1.11%	2.27%	0.45%	0.41%	0.84%	< 4.0
cis-1,2-Dichloroethene (MCL=70)	16,705	15,026	1,832	1.47%	1.45%	1.53%	0.03%	0.03%	0.00%	2.18
cis-1,2-Dichloropropene (N/A)	9,211	8,438	836	0.61%	0.52%	1.44%	N/A			< 1.0
Dibromochloromethane (HRL=60)	19,750	17,785	2,158	18.01%	12.41%	64.55%	0.06%	0.02%	0.32%	12.70
Dibromomethane (N/A)	16,549	14,953	1,720	0.36%	0.21%	1.69%	N/A			< 2.0
Dichlorodifluoromethane (MCL=1,000)	16,076	14,617	1,588	1.37%	1.38%	1.39%	0.00%	0.00%	0.00%	0.50
1,1-Dichloroethane (MCL=5)	20,483	18,758	1,876	1.14%	1.09%	1.55%	0.18%	0.16%	0.37%	0.10
1,2-Dichloroethane (MCL=5)	15,282	14,192	1,215	1.16%	1.10%	1.73%	0.19%	0.17%	0.41%	< 5.0
Dichloroethene (MCL=7)	15,430	14,180	1,380	1.17%	1.06%	1.45%	0.20%	0.20%	0.22%	1.80
Dichloromethane (MCL=5)	19,287	17,602	1,836	4.05%	3.31%	11.06%	0.77%	0.52%	3.27%	1.30
1,2-Dichloropropane (MCL=5)	19,591	17,908	1,820	0.67%	0.66%	0.77%	0.08%	0.09%	0.00%	< 4.0

CHEMICAL NAME (Threshold in µg/L)	Total # PWS	# GW PWS	# SW PWS	% PWS > MRL	% GW PWS > MRL	% SW PWS > MRL	% PWS > Threshold	% GW PWS > Threshold	% SW PWS > Threshold	99% Value (µg/L)
1,3-Dichloropropane (N/A)	16,947	15,338	1,748	0.12%	0.12%	0.11%	N/A			< 1.0
2,2-Dichloropropane (N/A)	16,757	15,138	1,754	0.15%	0.14%	0.23%	N/A			< 2.0
1,1-Dichloropropene (N/A)	16,947	15,332	1,749	0.13%	0.10%	0.40%	N/A			< 1.0
1,3- Dichloropropene (HRL=40)	9,164	8,303	898	0.16%	0.12%	0.56%	0.00%	0.00%	0.00%	< 1.0
Ethyl Benzene (MCL=700)	20,081	18,355	1,884	1.62%	1.40%	3.66%	0.00%	0.00%	0.00%	< 5.0
Hexachlorobutadiene (HRL=0.9)	12,284	10,980	1,385	0.35%	0.30%	0.72%	0.11%	0.06%	0.51%	< 5.0
Isopropylbenzene (N/A)	12,771	11,480	1,359	0.27%	0.28%	0.22%	N/A			< 2.0
m-Dichlorobenzene (HAL=600)	20,429	18,752	1,819	0.25%	0.20%	0.77%	0.00%	0.00%	0.00%	< 5.0
m-Xylene (N/A)	11,329	10,145	1,276	1.55%	1.47%	2.12%	N/A			< 4.0
n-Butylbenzene (N/A)	12,763	11,471	1,371	0.35%	0.29%	0.88%	N/A			< 2.0
n-Propylbenzene (N/A)	12,724	11,440	1,363	0.33%	0.34%	0.22%	N/A			< 2.0
Naphthalene (HRL=140)	13,452	12,034	1,502	1.18%	1.08%	1.93%	0.01%	0.02%	0.00%	< 5.0
o-Chlorotoluene (MCL=100)	15,721	14,154	1,702	0.20%	0.16%	0.53%	0.00%	0.00%	0.00%	< 1.0
o-Dichlorobenzene (MCL=600)	19,953	18,300	1,795	0.28%	0.20%	1.00%	0.00%	0.00%	0.00%	< 5.0
o-Xylene (N/A)	13,987	12,638	1,450	1.76%	1.69%	2.41%	N/A			< 5.0
p-Chlorotoluene (MCL=100)	15,612	14,057	1,689	0.17%	0.15%	0.36%	0.00%	0.00%	0.00%	< 1.0
p-Dichlorobenzene (MCL=750)	15,494	14,284	1,334	1.25%	1.11%	2.70%	0.00%	0.00%	0.00%	< 4.4
p-Isopropyltoluene (N/A)	12,167	10,953	1,282	0.25%	0.26%	0.08%	N/A			< 2.0
p-Xylene (N/A)	10,127	8,956	1,230	1.58%	1.49%	2.36%	N/A			< 5.0
sec-Butylbenzene (N/A)	12,343	11,071	1,337	0.23%	0.23%	0.22%	N/A			< 2.0
Styrene (MCL=100)	16,623	14,938	1,832	0.57%	0.45%	1.53%	0.00%	0.00%	0.00%	< 2.0
tert-Butylbenzene (N/A)	12,353	11,081	1,337	0.19%	0.19%	0.22%	N/A			< 2.0
1,1,1,2- Tetrachloroethane (HAL=70)	16,956	15,338	1,753	0.18%	0.13%	0.63%	0.00%	0.00%	0.00%	< 1.0
1,1,2,2-Tetrachloroethane (HAL=2)	20,407	18,693	1,867	0.45%	0.39%	1.02%	0.05%	0.05%	0.11%	< 1.0
Tetrachloroethylene (MCL=5)	19,814	18,298	1,652	3.33%	3.38%	2.66%	0.91%	0.93%	0.67%	13.2
Toluene (MCL=100)	20,089	18,364	1,887	3.50%	3.10%	7.31%	0.00%	0.00%	0.00%	0.7
trans-1,2-Dichloroethene (MCL=100)	19,945	18,267	1,825	0.64%	0.59%	1.10%	0.01%	0.01%	0.00%	< 1.0
trans-1,3-Dichloropropene (N/A)	9,883	9,017	959	0.25%	0.13%	1.36%	N/A			< 1.0
1,2,3-Trichlorobenzene (N/A)	12,876	11,567	1,389	0.49%	0.46%	0.72%	N/A			< 5.0
1,2,4-Trichlorobenzene (MCL=70)	13,449	11,996	1,539	0.49%	0.45%	0.78%	0.00%	0.00%	0.00%	< 5.0
1,1,1-Trichloroethane (MCL=200)	15,279	14,191	1,213	3.66%	3.57%	4.62%	0.03%	0.03%	0.00%	3.7

CHEMICAL NAME (Threshold in µg/L)	Total # PWS	# GW PWS	# SW PWS	% PWS > MRL	% GW PWS > MRL	% SW PWS > MRL	% PWS > Threshold	% GW PWS > Threshold	% SW PWS > Threshold	99% Value (µg/L)
1,1,2-Trichloroethane (MCL=5)	19,964	18,253	1,853	0.43%	0.29%	1.78%	0.04%	0.02%	0.16%	< 1.0
Trichloroethylene (MCL=5)	15,290	14,198	1,220	3.54%	3.37%	5.66%	0.98%	1.00%	0.66%	20.8
Trichlorofluoromethane (HAL=175)	16,851	15,347	1,637	1.48%	1.39%	2.32%	0.01%	0.01%	0.00%	0.6
1,2,3-Trichloropropane (MCL=40)	17,392	15,771	1,758	0.25%	0.25%	0.23%	0.01%	0.01%	0.00%	< 2.0
1,2,4-Trimethylbenzene (N/A)	12,755	11,462	1,372	0.83%	0.76%	1.38%	N/A			< 2.0
1,3,5-Trimethylbenzene (N/A)	12,671	11,379	1,370	0.61%	0.59%	0.66%	N/A			< 2.0
Vinyl Chloride (MCL=2)	15,184	14,099	1,209	0.50%	0.44%	1.24%	0.28%	0.23%	0.83%	< 2.0
Xylenes (Total) (MCL=10,000)	9,463	8,841	670	3.04%	2.51%	10.75%	0.00%	0.00%	0.00%	0.6

[1] The high occurrence of Ethylene Dibromide are, in part, considered false positives related to analytical methods problems.

MCL=Maximum Contaminant Level
HAL=Health Advisory Level (as of December 2000)
HRL=Health Reference Level (concentration values used only as reference levels for analyses in this report)
MRL=Minimum Reporting Level

The MCL, HAL, HRL, and MRL values are used in this report only as reference levels to facilitate occurrence assessments.

"% PWS > Threshold" indicates the proportion of systems with any analytical results exceeding the concentration value of the HRL/MCL/HAL. (Note that results for % PWSs greater than an MCL value does not indicate a MCL violation. A formal MCL violation occurs when the MCL is exceeded by the average of four consecutive quarterly samples or confirmation samples as required by the primacy States.)

N/A= There is no HRL/MCL/HAL available

V.B. SDWIS/FED (Round 2) Contaminant Occurrence

Table V.B.1 summarizes the occurrence data of the SDWIS/FED (Round 2) 20 cross-section states for the 48 Round 2 contaminants. This table presents the total number of unique public water systems, the percent of public water systems with at least one result greater than the MRL, the percent of public water systems with at least one result greater than the MCL/HRL/HAL and, finally, the 99th percentile value in micrograms per liter (Fg/L). (To review a map of the SDWIS/FED Round 2 cross-section states, refer to Figure III.B.3.b.)

The 20 SDWIS/FED (Round 2) cross-section states reflect a significant national coverage: these states contain approximately 41% of public water systems nationally and 34% of the population served by public water systems. For a significant majority of the contaminants evaluated here (40 out of 48), less than 1% of public water systems in the cross-section states have analytical detections (any sample analytical result greater than the MRL). Two contaminants (dichlorodifluoromethane and trichlorofluoromethane) are detected in 1 to 2% of public water systems, as evidenced by one or more sample analytical results greater than the MRL, and 1 contaminant (chloromethane) is detected in 2.25% of public water systems, as evidenced by one or more sample analytical results greater than the MRL. Five contaminants –4 THMs and sulfate– have a considerably higher percent of systems with one or more sample analytical results greater than the MRL (ranging from 12.12% to 27.42% for the THMs and 88.11% for sulfate). Select SDWIS/FED (Round 2) high occurrence contaminants are identified and briefly assessed in Section VI.

Table V.B.1. SDWIS/FED (Round 2) Data - 20 State Cross-Section Summary of Occurrence

CHEMICAL NAME (Threshold in µg/L)	Total PWS	# GW PWS	# SW PWS	% PWS > MRL	% GW PWS	% SW PWS	% PWS > Threshol	% GW PWS >	% SW PWS >	99% Value
IOCs										
Sulfate (HRL=500,000)	16,495	15,009	1,486	88.11%	87.76%	91.66%	1.79%	1.83%	1.41%	560000
SOCs										
Aldicarb[1] (HRL=7)	11,972	10,509	1,463	0.01%	0.00%	0.07%	0.00%	0.00%	0.00%	< 3.0
Aldicarb Sulfone[1] (HRL=7)	11,968	10,512	1,456	0.08%	0.04%	0.41%	0.00%	0.00%	0.00%	< 2.0
Aldicarb Sulfoxide[1] (HRL=7)	11,954	10,500	1,454	0.08%	0.03%	0.48%	0.01%	0.01%	0.00%	< 4.0
Aldrin[1] (HRL=0.002)	11,745	10,420	1,325	0.01%	0.01%	0.00%	0.01%	0.01%	0.00%	< 2.0
Butachlor[1] (N/A)	11,940	10,482	1,458	0.04%	0.01%	0.27%	N/A			< 10.0
Carbaryl[1] (MCL=700)	12,623	11,086	1,537	0.03%	0.02%	0.13%	0.00%	0.00%	0.00%	< 10.0
Dicamba[1] (MCL=200)	14,034	12,220	1,814	0.34%	0.21%	1.21%	0.00%	0.00%	0.00%	< 10.0
Dieldrin[1] (HRL=0.002)	11,788	10,329	1,459	0.09%	0.09%	0.14%	0.09%	0.09%	0.14%	< 1.0
3-Hydroxycarbofuran[1] (N/A)	12,644	11,088	1,556	0.07%	0.02%	0.45%	N/A			< 10.0
Methomyl[1] (MCL=200)	12,604	11,068	1,536	0.07%	0.05%	0.20%	0.00%	0.00%	0.00%	< 50.0
Metolachlor[1] (HRL=70)	12,953	11,503	1,450	0.83%	0.11%	6.55%	0.00%	0.00%	0.00%	< 5.0
Metribuzin[1] (HRL=91)	13,512	11,833	1,679	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	< 2.0
Propachlor[1] (MCL=90)	12,050	10,600	1,450	0.05%	0.02%	0.28%	0.00%	0.00%	0.00%	< 5.0
VOCs										
Bromobenzene (N/A)	24,125	21,461	2,664	0.13%	0.12%	0.23%	N/A			< 1.0
Bromochloromethane[2] (MCL=10)	22,974	20,507	2,467	0.46%	0.32%	1.62%	0.03%	0.02%	0.08%	< 1.0
Bromodichloromethane (HRL=60)	23,858	21,152	2,706	21.97%	16.14%	67.52%	0.08%	0.05%	0.30%	18.8
Bromoform (HRL=400)	18,461	16,348	2,113	12.12%	11.08%	20.11%	0.01%	0.00%	0.05%	6.5
Bromomethane (MCL=10)	23,328	20,872	2,456	0.75%	0.74%	0.86%	0.06%	0.05%	0.08%	< 9.0
Chloroethane (N/A)	24,433	21,925	2,508	0.34%	0.32%	0.56%	N/A			< 2.5
Chloroform (HRL=600)	23,737	21,021	2,716	27.42%	21.84%	70.54%	0.04%	0.01%	0.26%	110.0
Chloromethane (MCL=3)	23,478	21,030	2,448	2.25%	2.04%	4.08%	0.58%	0.55%	0.78%	< 2.5
Dibromochloromethane (HRL=60)	23,750	21,059	2,691	18.37%	14.55%	48.23%	0.08%	0.05%	0.30%	9.7
Dibromomethane (N/A)	23,006	20,454	2,552	0.46%	0.32%	1.53%	N/A			< 1.0
Dichlorodifluoromethane[2] (MCL=1,000)	22,141	19,836	2,305	1.27%	1.23%	1.65%	0.00%	0.00%	0.00%	< 20.0
1,1-Dichloroethane (MCL=5)	24,808	22,114	2,694	0.74%	0.67%	1.34%	0.08%	0.07%	0.11%	< 1.0
1,3-Dichloropropane (N/A)	24,065	21,430	2,635	0.06%	0.05%	0.11%	N/A			< 2.0
2,2-Dichloropropane (N/A)	24,096	21,445	2,651	0.09%	0.07%	0.26%	N/A			< 1.0
1,1-Dichloropropene (N/A)	24,069	21,438	2,631	0.07%	0.06%	0.15%	N/A			< 1.0

CHEMICAL NAME (Threshold in µg/L)	Total PWS	# GW PWS	# SW PWS	% PWS > MRL	% GW PWS	% SW PWS	% PWS > Threshol	% GW PWS >	% SW PWS >	99% Value
1,3- Dichloropropene (HRL=40)	16,787	15,178	1,609	0.35%	0.32%	0.62%	0.00%	0.00%	0.00%	< 0.5
Hexachlorobutadiene[2] (HRL=0.9)	22,736	20,380	2,356	0.18%	0.13%	0.59%	0.02%	0.00%	0.13%	< 1.0
Isopropylbenzene[2] (N/A)	22,995	20,524	2,471	0.24%	0.23%	0.32%	N/A			< 2.0
m-Dichlorobenzene (HAL=600)	24,119	21,457	2,662	0.26%	0.22%	0.53%	0.00%	0.00%	0.00%	< 1.0
n-Butylbenzene[2] (N/A)	22,972	20,509	2,463	0.13%	0.12%	0.20%	N/A			< 2.0
n-Propylbenzene[2] (N/A)	22,969	20,501	2,468	0.23%	0.19%	0.57%	N/A			< 2.0
Naphthalene[2] (HRL=140)	22,923	20,524	2,399	0.75%	0.62%	1.92%	0.00%	0.00%	0.00%	< 2.0
o-Chlorotoluene (MCL=100)	24,118	21,457	2,661	0.14%	0.11%	0.38%	0.00%	0.00%	0.00%	< 2.0
p-Chlorotoluene (MCL=100)	21,378	18,808	2,570	0.12%	0.10%	0.27%	0.00%	0.00%	0.00%	< 2.0
p-Isopropyltoluene[2] (N/A)	22,617	20,320	2,297	0.16%	0.15%	0.26%	N/A			< 2.0
sec-Butylbenzene[2] (N/A)	22,973	20,509	2,464	0.14%	0.14%	0.20%	N/A			< 2.0
tert-Butylbenzene[2] (N/A)	22,973	20,508	2,465	0.11%	0.10%	0.16%	N/A			< 2.0
1,1,1,2-Tetrachloroethane (HAL=70)	24,127	21,462	2,665	0.21%	0.16%	0.64%	0.00%	0.00%	0.00%	< 1.0
1,1,2,2-Tetrachloroethane (HAL=2)	24,800	22,106	2,694	0.08%	0.05%	0.30%	0.00%	0.00%	0.00%	< 1.0
1,2,3-Trichlorobenzene[2] (N/A)	22,532	20,144	2,388	0.19%	0.15%	0.50%	N/A			< 2.0
Trichlorofluoromethane[2] (HAL=175)	22,659	20,329	2,330	1.17%	0.93%	3.22%	0.00%	0.00%	0.00%	< 2.5
1,2,3-Trichloropropane (MCL=40)	24,088	21,441	2,647	0.08%	0.06%	0.23%	0.00%	0.00%	0.00%	< 1.0
1,2,4-Trimethylbenzene[2] (N/A)	22,965	20,504	2,461	0.76%	0.63%	1.79%	N/A			< 1.0
1,3,5-Trimethylbenzene[2] (N/A)	22,974	20,513	2,461	0.43%	0.35%	1.10%	N/A			< 2.0

1. Massachusetts data not included in summary statistics for this contaminant.
2. New Hampshire data not included in summary statistics for this contaminant.

MCL=Maximum Contaminant Level
HAL=Health Advisory Level (as of December 2000)
HRL=Health Reference Level (concentration values used only as reference levels for analyses in this report)
MRL=Minimum Reporting Level

The MCL, HAL, HRL, and MRL values are used in this report only as reference levels to facilitate occurrence assessments.

"% PWS > Threshold" indicates the proportion of systems with any analytical results exceeding the concentration value of the HRL/MCL/HAL. (Note that results for % PWSs greater than an MCL value does not indicate a MCL violation. A formal MCL violation occurs when the MCL is exceeded by the average of four consecutive quarterly samples or confirmation samples as required by the primacy States.)

N/A= There is no HRL/MCL/HAL available

VI. ASSESSMENTS OF SELECT HIGH OCCURRENCE CONTAMINANTS

VI.A. Select High Occurrence Contaminants and Detailed Graphical and Spatial Analysis

The contaminants in URCIS (Round 1) and SDWIS/FED (Round 2) were ranked according to their occurrence as a means to select a group of high occurrence contaminants for a more detailed graphical and spatial assessments. These detailed assessments are included in Section VI of the compete National Occurrence report (Occurrence of Unregulated Contaminants in Public Water Systems: An Initial Assessment, EPA 815-P-00-001). This summary report provides only a description of the types of assessments included in the complete report.

The ranking of the URCIS (Round 1) contaminant occurrence data is presented in Table VI.A.1, and the ranking of SDWIS/FED (Round 2) data is presented in Table VI.A.2. The contaminants were ranked by percent of systems with at least one sample detection (at least one sample analytical result greater than the minimum reporting level) and by percent of systems with at least one sample analytical result greater than the MCL or HAL or HRL (whichever MCL/HAL/HRL health effects threshold is relevant to the contaminant in question).

Table VI.A.3 identifies the high occurrence contaminants selected for detailed assessments. High occurrence was the primary consideration for selection for the detailed assessments included in the complete National Occurrence report, but consideration was also given to coverage across contaminant groups, changing regulatory status between Rounds 1 and 2, and overlap between Rounds 1 and 2.

Table VI.A.1. Contaminant Occurrence Ranking of URCIS (Round 1) Data

	Percent Systems With At Least One Sample Analytical Detection	
	SOCs	
	Dibromochloropropane	2.49%
X	Ethylene Dibromide	1.14%
	VOCs	
X	Chloroform	28.63%
	Bromodichloromethane	22.09%
	Dibromochloromethane	17.87%
	Bromoform	8.95%
	Dichloromethane	4.05%
	1,1,1-Trichloroethane	3.66%
X	Trichloroethylene	3.54%
	Toluene	3.50%
X	Tetrachloroethylene	3.33%
	Xylenes (Total)	3.04%
	o-Xylene	1.76%
	Ethyl Benzene	1.62%
	p-Xylene	1.58%
	m-Xylene	1.55%
	Trichlorofluoromethane	1.48%
	cis-1,2-Dichloroethene	1.47%
	Dichlorodifluoromethane	1.37%
	Carbon Tetrachloride	1.32%
	p-Dichlorobenzene	1.25%
X	Chloromethane	1.22%
	Naphthalene	1.18%
	Dichloroethene	1.17%
	1,2-Dichloroethane	1.16%
	Benzene	1.14%
X	1,1-Dichloroethane	1.14%

	Percent Systems With At Least One Sample Analytical Result Greater than MCL/HAL/HRL	
	SOCs	
	Dibromochloropropane	1.32%
X	Ethylene Dibromide	0.16%
	VOCs	
X	Trichloroethylene	0.98%
X	Tetrachloroethylene	0.91%
	Dichloromethane	0.77%
X	Chloromethane	0.45%
	Vinyl Chloride	0.28%
	Benzene	0.25%
	Dichloroethene	0.20%
	1,2-Dichloroethane	0.19%
X	1,1-Dichloroethane	0.18%
	Carbon Tetrachloride	0.16%
	Bromodichloromethane	0.13%
	Hexachlorobutadiene	0.11%
	Bromomethane	0.09%
	1,2-Dichloropropane	0.08%
	Dibromochloromethane	0.06%
	1,1,2,2-Tetrachloroethane	0.05%
	1,1,2-Trichloroethene	0.04%
	Bromochloromethane	0.03%
	cis-1,2-Dichloroethene	0.03%
	1,1,1-Trichloroethane	0.03%
X	Chloroform	0.02%
	Naphthalene	0.01%
	Trichlorofluoromethane	0.01%
	1,2,3-Trichloropropane	0.01%
	Bromoform	0.01%

	Percent Systems With At Least One Sample Analytical Detection		Percent Systems With At Least One Sample Analytical Result Greater than MCL/HAL/HRL	
	1,2,4-Trimethylbenzene	0.83%	trans-1,2-Dichloroethene	0.01%
	Bromomethane	0.77%	Toluene	0.00%
	1,2-Dichloropropane	0.67%	Xylenes (Total)	0.00%
	trans-1,2-Dichloroethene	0.64%	Ethyl Benzene	0.00%
	cis-1,2-Dichloropropene	0.61%	Dichlorodifluoromethane	0.00%
	1,3,5-Trimethylbenzene	0.61%	p-Dichlorobenzene	0.00%
	Styrene	0.57%	Styrene	0.00%
	Chlorobenzene	0.53%	Chlorobenzene	0.00%
	Bromochloromethane	0.50%	1,2,4-Trichlorobenzene	0.00%
	Vinyl Chloride	0.50%	o-Dichlorobenzene	0.00%
	1,2,4-Trichlorobenzene	0.49%	m-Dichlorobenzene	0.00%
	1,2,3-Trichlorobenzene	0.49%	o-Chlorotoluene	0.00%
	1,1,2,2-Tetrachloroethane	0.45%	1,1,1,2-Tetrachloroethane	0.00%
	1,1,2-Trichloroethene	0.43%	p-Chlorotoluene	0.00%
	Chloroethane	0.39%	1,3-Dichloropropene	0.00%
	Dibromomethane	0.36%	1,3-Dichloropropane	N/A
	n-Butylbenzene	0.35%	1,1-Dichloropropene	N/A
	Hexachlorobutadiene	0.35%	1,2,3-Trichlorobenzene	N/A
	n-Propyulbenzene	0.33%	1,2,4-Trimethylbenzene	N/A
	o-Dichlorobenzene	0.28%	1,3,5-Trimethylbenzene	N/A
	Isopropyltoluene	0.27%	2,2-Dichloropropane	N/A
	1,2,3-Trichloropropane	0.25%	Bromobenzene	N/A
	trans-1,3-Dichloropropene	0.25%	Chloroethane	N/A
	m-Dichlorobenzene	0.25%	cis-1,2-Dichloropropene	N/A
	p-Isopropyltoluene	0.25%	Dibromomethane	N/A
	sec-Butylbenzene	0.23%	Isopropyltoluene	N/A
	o-Chlorotoluene	0.20%	m-Xylene	N/A
	Bromobenzene	0.19%	n-Butylbenzene	N/A
	tert-Butylbenzene	0.19%	n-Propyulbenzene	N/A
	1,1,1,2-Tetrachloroethane	0.18%	o-Xylene	N/A
	p-Chlorotoluene	0.17%	p-Isopropyltoluene	N/A
	1,3-Dichloropropene	0.16%	p-Xylene	N/A
	2,2-Dichloropropane	0.15%	sec-Butylbenzene	N/A
	1,1-Dichloropropene	0.13%	tert-Butylbenzene	N/A
	1,3-Dichloropropane	0.12%	trans-1,3-Dichloropropene	N/A

X = Contaminants selected for graphical/spatial assessment in complete National Occurrence report.

N/A = There is no Health Reference Level (HRL), Maximum Contaminant Level (MCL), or Health Advisory Level (HAL) for the contaminants.

Table VI.A.2. Contaminant Occurrence Ranking of SDWIS/FED (Round 2) Data

	Percent Systems With At Least One Sample Analytical Detection			Percent Systems With At Least One Sample Analytical Result Greater than MCL/HAL/HRL		
	SOCs				SOCs	
X	Metolachlor	0.83%		**X**	Dieldrin	0.09%
	Dicamba	0.34%			Aldrin	0.01%
X	Dieldrin	0.09%		**X**	Aldicarb Sulfoxide	0.01%
X	Aldicarb Sulfoxide	0.08%			Metribuzin	0.00%
	Aldicarb Sulfone	0.08%			Aldicarb	0.00%
	Methomyl	0.07%			Carbaryl	0.00%
	3-Hydroxycarbofuran	0.07%			Propachlor	0.00%
	Propachlor	0.05%			Methomyl	0.00%
	Butachlor	0.04%			Aldicarb Sulfone	0.00%
	Carbaryl	0.03%			Dicamba	0.00%
	Aldrin	0.01%		**X**	Metolachlor	0.00%
	Aldicarb	0.01%			Butachlor	N/A
	Metribuzin	0.01%			3-Hydroxycarbofuran	N/A

	Percent Systems With At Least One Sample Analytical Detection	
	VOCs	
X	Chloroform	27.42%
	Bromodichloromethane	21.97%
	Dibromochloromethane	18.37%
	Bromoform	12.12%
X	Chloromethane	2.25%
	Dichlorodifluoromethane	1.27%
	Trichlorofluoromethane	1.17%
	1,2,4-Trimethylbenzene	0.76%
	Naphthalene	0.75%
	Bromomethane	0.75%
X	1,1-Dichloroethane	0.74%
	Bromochloromethane	0.46%
	Dibromomethane	0.46%
	1,3,5-Trimethylbenzene	0.43%
	1,3-Dichloropropene	0.35%
	Chloroethane	0.34%
	m-Dichlorobenzene	0.26%
	Isopropylbenzene	0.24%
	n-Propylbenzene	0.23%
	1,1,1,2-Tetrachloroethane	0.21%
	1,2,3-Trichlorobenzene	0.19%
	Hexachlorobutadiene	0.18%
	p-Isopropyltoluene	0.16%
	sec-Butylbenzene	0.14%
	o-Chlorotoluene	0.14%
	Bromobenzene	0.13%
	n-Butylbenzene	0.13%
	p-Chlorotoluene	0.12%
	tert-Butylbenzene	0.11%
	2,2-Dichloropropane	0.09%
	1,2,3-Trichloropropane	0.08%
	1,1,2,2-Tetrachloroethane	0.08%
	1,1-Dichloropropene	0.07%
	1,3-Dichloropropane	0.06%

	Percent Systems With At Least One Sample Analytical Result Greater than MCL/HAL/HRL	
	VOCs	
X	Chloromethane	0.58%
X	1,1-Dichloroethane	0.08%
	Dibromochloromethane	0.08%
	Bromodichloromethane	0.08%
	Bromomethane	0.06%
X	Chloroform	0.04%
	Bromochloromethane	0.03%
	Hexachlorobutadiene	0.02%
	Bromoform	0.01%
	1,2,3-Trichloropropane	0.00%
	1,1,1,2-Tetrachloroethane	0.00%
	1,1,2,2-Tetrachloroethane	0.00%
	1,3-Dichloropropene	0.00%
	Dichlorodifluoromethane	0.00%
	m-Dichlorobenzene	0.00%
	Naphthalene	0.00%
	o-Chlorotoluene	0.00%
	p-Chlorotoluene	0.00%
	Trichlorofluoromethane	0.00%
	1,1-Dichloropropene	N/A
	1,2,3-Trichlorobenzene	N/A
	1,2,4-Trimethylbenzene	N/A
	1,3,5-Trimethylbenzene	N/A
	1,3-Dichloropropane	N/A
	2,2-Dichloropropane	N/A
	Bromobenzene	N/A
	Chloroethane	N/A
	Dibromomethane	N/A
	Isopropylbenzene	N/A
	n-Butylbenzene	N/A
	n-Propylbenzene	N/A
	p-Isopropyltoluene	N/A
	sec-Butylbenzene	N/A
	tert-Butylbenzene	N/A

X = Contaminants selected for graphical/spatial assessment in complete National Occurrence report.
N/A = There is no Health Reference Level (HRL), Maximum Contaminant Level (MCL), or Health Advisory Level (HAL) for

Table VI.A.3. High Occurrence Contaminants Selected for Graphical and Spatial Assessments (and some characteristics considered in the selection).

Contaminant	Regulated	Unregulated	VOC	SOC	THM	URCIS (Round 1)	SDWIS/ FED (Round 2)
Trichloroethylene	(Round 2)	V	V			V	
Tetrachloroethylene	(Round 2)	V	V			V	
Chloromethane		V	V			V	V
1,1-Dichloroethane		V	V			V	V
Chloroform		V	V		V	V	V
Ethylene Dibromide	(Round 2)	V		V		V	
Dieldrin		V		V			V
Aldicarb Sulfoxide		V		V			V
Metolachlor		V		V			V

VI.B. Graphical and Spatial Assessments of Select High Occurrence Contaminants

The detailed graphical and spatial assessments of the high occurrence contaminants identified above are included in Section VI.B.of the complete National Occurrence report. These assessments, evaluated together with the analytical results tables presented throughout the complete National Occurrence report and report appendices, provide a comprehensive overview of the degree, distribution, and temporal trends (if any) of contaminant occurrence. The graphical and spatial assessments are conducted to provide additional analytical detail for the select high occurrence contaminants (of potentially greater regulatory interest), and to provide examples of graphical and spatial assessments that can be conducted for any other contaminants of interest. For contaminants of lower occurrence, however, the data maybe too sparse to support these types of assessments.

One important aspect of the cross-section state data must be considered as part of any conclusions drawn from the maps and graphs in the complete National Occurrence report and this national summary. The national cross-sections have been developed from public water systems' contaminant monitoring data with the intent that, in aggregate, the cross-section states' occurrence findings are indicative of national occurrence. Given that half (or more) of the states are without adequate data (and therefore could not be included in the cross-sections used for analyses), sub-national occurrence findings, such as regional or multi-state patterns, may be difficult to characterize and must be interpreted with caution. Supplemental information should be collected and used, whenever possible, to assist in evaluating the significance of any apparent or suggested regional patterns.

To provide the broadest possible geographic coverage, some occurrence maps are presented that use all available data from all states with data in URCIS (Round 1) and/or SDWIS/FED (Round 2) (see the complete National Occurrence report Section V.I., Figures VI.B.1.a, VI.B.2.a, VI.B.3.a, VI.B.4.a, VI.B.5.a, VI.B.6.a, VI.B.7.a, and VI.B.8.a). This use of all data, including incomplete state data sets, and "biased" state data sets is only appropriate for broad, simple identifications of presence or absence of a detection of a specific contaminant. This more extensive use of the data in the databases can be appropriate when a simple identification of states with any PWS contaminant detection is of interest. The biased data used in these figures are not and cannot be used for any national estimates of contaminant occurrence.

The remaining, majority of figures presented in the complete National Occurrence report have been based only on non-biased, representative cross-section state data, and are used to characterize the distribution of contaminant occurrence. For example, the cross-section state data are used to develop maps that categorize states as based on the range of percent of state PWSs with detections of a particular contaminant (see Figures VI.B.1.b., VI.B.2.b, VI.B.3.b, VI.B.4.b, VI.B.5.b, VI.B.6.b, VI.B.7.b, and VI.B.8.b).

Additionally, the temporal distribution of the percent of systems with contaminant detections, or the percent of systems with sample results of contaminants identified above the MCL (or HRL) by year are presented in Figures VI.B.1.c., VI.B.2.c, VI.B.3.c, VI.B.4.c, VI.B.5.c, VI.B.6.c, VI.B.7.d, VI.B.8.d, and VI.B.9.a.

VI.B.1. Ethylene Dibromide

A spatial assessment of contaminant occurrence using URCIS (Round 1) data for ethylene dibromide suggests a widespread occurrence. However, there is no apparent spatial/geographic occurrence pattern within the wide extent of occurrence.

In temporal assessments of ethylene dibromide occurrence, there appears to be a steady but slight decrease in the percent of public water systems with ethylene dibromide detections (analytical results greater than the MRL) from 1988 to 1992. There is also a less consistent, but apparent decrease in the percent of public water systems with analytical results greater than the MCL during the same time period (1988 to 1992).

VI.B.2. Tetrachloroethylene

Tetrachloroethylene (sometimes referred to as perchloroethylene, or 'perc', or PCE) is also of very widespread occurrence and with no apparent spatial occurrence pattern. (Also noted is the well-established co-occurrence of this contaminant with trichloroethylene.)

In temporal assessments of occurrence, there may be a decrease in the percent of public water systems with detections and with analytical results greater than the MCL for the 1988 to 1992 period. However, the percent of public water systems increases for both measures (detections and MCL exceedances) in 1992. Note, however, that unavailable state data may affect interpretation of temporal trends.

VI.B.3. Trichloroethylene

The occurrence overview of trichloroethylene (sometimes referred to as TCE) is similar to that of tetrachloroethylene. Trichloroethylene is also of very widespread occurrence and with no apparent spatial occurrence pattern. (Also noted is the well-established co-occurrence of this contaminant with tetrachloroethylene.)

Also, in temporal assessments of occurrence, there may be a decrease in the percent of public water systems with detections and with analytical results greater than the MCL for the 1988 to 1992 period. However, the percent of public water systems increases for both measures (detections and MCL exceedances) in 1992. Note, however, the same caution regarding unavailable state data possibly affecting interpretation of temporal trends.

VI.B.4. Aldicarb Sulfoxide

A review of the aldicarb sulfoxide illustrates some of the interpretive cautions mentioned previously. The spatial assessment based on SDWIS/FED Round 2 data suggests that aldicarb sulfoxide detections are more evident in northern states (likely related to specific farm crops and pesticide use). Higher percentages of public water systems with detections (analytical results greater than the MRL) are indicated in Michigan, Missouri, Washington, and Oregon. Only Oregon is present in the category of highest percentage of public water systems with analytical results of aldicarb sulfoxide greater than the HRL.

However, three states (Florida, New York, and Wisconsin) with known, historic problems with aldicarb sulfoxide in groundwater do not have data in the SDWIS/FED (Round 2) database. Apparent spatial and geographic patterns must be viewed and interpreted carefully. Any conclusions made regarding the geographic patterns (or lack of patterns) of occurrence must consider this reality of missing data coverage.

In the temporal assessment, a "spike" (a significant but short-lived increase) in 1996 in the percent of public water systems with analytical results greater than the HRL appears significant, but

actually reflects a very small increase in the number of systems. Therefore, there is no temporal trend, with occurrence remaining relatively low from 1992 to 1997.

VI.B.5. Dieldrin

Dieldrin detections appear to be limited to states south of a line extending between Texas and Massachusetts (though there are many states without dieldrin data).

Although occurrence appears high in 1992 with a subsequent drop, occurrence data for 1992 was sometimes inconsistently reported since that year marks the divide between the Round 1 and Round 2 monitoring periods. The implementation of the SDWA 1993 amendments may influence any occurrence findings critically centered around the 1992 and 1993 data.

VI.B.6. Metolachlor

Metolachlor also appears to be of widespread, but generally low, occurrence. However, many states did not report metolachlor data. This is especially important given that the cornbelt states with the highest metolachlor use (Indiana, Illinois, and Iowa) do not have any metolachlor data in the SDWIS/FED (Round 2) data. In this case, supplemental information is needed to more fully assess the national occurrence of metolachlor.

VI.B.7. 1,1-Dichloroethane

Data are available from both Round 1 and Round 2 for 1,1-dichloroethane. Using only cross-section state data, 32 of the 34 combined cross-section states have public water systems with at least one detection of 1,1-dichloroethane. An expanded use of available data shows that 42 of the 46 states with data (which includes cross-section as well as any available non-cross-section state data) have public water systems with at least one detection of 1,1-dichloroethane. The biased (non-cross-section state) data can be used here to expand the spatial coverage.

Based on the percentage of PWSs with analytical results greater than the detection limit, there appears to be generally higher levels of occurrence in states east of the Mississippi River. Again, supplemental information would be necessary to make definitive conclusions on 1,1-dichloroethane occurrence distributions.

Regarding temporal trends, there appears to be a decrease in the occurrence of 1,1-dichloroethane from 1986 to 1997 when based on either percent PWSs with analytical results greater then the detection limit or greater than the MCL.

Comparisons were also made for 1,1-dichloroethane occurrence between Round 1 to Round 2 for the 8 states with data in both sampling rounds. With occurrence based on the detection limit, no consistent temporal trend is suggested. When occurrence is based on MCLs, there is an apparent decreasing trend of 1,1-dichloroethane occurrence in 4 of the 8 states (with the other 4 states indicating no occurrence in either rounds). These results seem to at least partially corroborate the decreasing occurrence trend over time indicated above.

VI.B.8. Chloromethane

Detections and distribution of chloromethane are addressed with maps and graphs similar to those for 1,1-dichloroethane. Chloromethane is of widespread and relatively high levels of occurrence.

Temporally, occurrence may have decreased from 1988 to 1992, but in later years appears to be increasing, based on percent public water systems with detections. The occurrence of chloromethane appears to be stable, based on percent public water systems with analytical results greater than the MCL.

VI.B.9. Chloroform

Chloroform is evaluated only temporally. Occurrence for chloroform, as is typical of the THMs, is relatively high based on the percent of systems with analytical detections. In contrast, the occurrence of chloroform in public water systems greater than the HRL are relatively low. Also, chloroform occurrence appears to increase from Round 1 to Round 2.

VI.B.10. Comparison of Occurrence in URCIS (Round 1) and SDWIS/FED (Round 2)

Occurrence data for three contaminants were contained in both Round 1 and Round data sets: chloromethane, 1,1-dichloroethane, and chloroform. Review of the data suggest no distinct or apparent temporal trends between occurrence of these three contaminants between the periods of URCIS (Round 1) and SDWIS/FED (Round 2) monitoring.